DOCUMENT RESUME

ED 232 018 CE 036 470

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TITLE Curriculum Styles and Strategies. A Review of Styles and Strategies of Curriculum Innovation in Secondary (and Higher) Education and Their Relevance and Applicability to Further Education. A Project Report.
INSTITUTION Keele Univ. (England). Inst. of Education.
SPONS AGENCY Further Education Curriculum Review and Development Unit, London (England).
REPORT NO ISBN-0-85522-116-X
PUB DATE Dec 82
NOTE 154p.
AVAILABLE FROM Publications Despatch Centre, Department of Education and Science, Honeypot Lane, Canons Park, Stanmore, Middlesex, HA71AZ.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC07 Plus Postage.
DESCRIPTORS Curriculum; *Curriculum Design; *Curriculum Development; Educational Objectives; Evaluation Methods; Foreign Countries; Higher Education; Models; *Postsecondary Education; Secondary Education; *Student Evaluation; *Teaching Methods; *Vocational Education
IDENTIFIERS *Great Britain

ABSTRACT

Curriculum development at the secondary and higher education levels was examined to identify issues and features of interest to curriculum workers within the further education sector. The main study of the curriculum projects was concentrated on an indepth analysis of four key variables: (1) aims, goals, objectives, and associated curriculum models; (2) the organization of curriculum content; (3) instructional procedures; and (4) evaluation and assessment. Advantages and disadvantages were considered for two models of curriculum development based respectively on objectives and procedures. Two basic processes of organizing curricular content were defined and illustrated--integration and coordination. Instructional procedures were appraised in terms of four dimensions about which a curriculum planner must make decisions when determining instructional procedures: discovery, experience, control, and autonomy of learning. Development of evaluation methods for cognitive abilities, psychomotor skills, and affective characteristics was also studied. The analysis was related to curriculum development in further education, and it was concluded that many curricular issues in further education are similar to those in secondary and higher education. Criticism was made of the emphasis on the objectives model and inconsistent terminology in further education. (An overview of selected projects is appended.) (YLB)

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Further Education Curriculum Review and Development Unit

A Project Report

ED232018

Curriculum styles and strategies

A review of styles and strategies of curriculum innovation in secondary (and higher) education and their relevance and applicability to further education.

Gay Heathcote, Richard Kempa and Iolo Roberts

Commissioned by the FEU from the Department of Education, University of Keele

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ISBN 0 85522 116 X

December 1982

FURTHER EDUCATION CURRICULUM REVIEW AND DEVELOPMENT UNIT

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Dear Sir/Madam

CURRICULUM STYLES AND STRATEGIES

I enclose a copy of the above titled document, resulting from a project commissioned from Keele University in 1979. The authors analyse a number of curricular enterprises outside FE, mainly at the secondary level. From these analyses they identify major issues and strategies; and in their final section they attempt to explore the implications of their findings for FE.

Insofar as the authors examine the rationale of many Schools Council secondary school curricular innovations, this publication should be of interest to those interested in school as well as FE curricula. They compare central, to institution-based and collaborative curricular approaches; they identify the foci of projects in terms of content, pedagogical strategies and teachers' role perception; they discuss the use of aims, goals and objectives in curriculum development; and they define and compare two models of curriculum development based respectively on objectives and processes. The authors then proceed to define and illustrate, two basic processes of organising curricular content: either via a process of integration, where subjects lose their identity; or via co-ordination, where subjects are linked together without losing their identities. A further section appraises instructional procedures in dimensions of discovery, experience, control and autonomy of learning. Another part of the analysis deals with the factors of evaluation and assessment.

A final chapter relates this analysis to curriculum development in FE and they conclude:

i) that many of the curricular issues in FE are similar to those in schools; and

ii) that there is considerable scope for improvement.

BEC and TEC "need to question their undue emphasis on the Objectives model"; the RSA should emulate the CGLI and "question the continuing viability... of outline syllabuses"; and the FEU itself should move towards a more consistent terminology. Few indeed escape criticism.

The authors hope that the report will assist in raising the level of curriculum expertise, provide useful hints and guidelines for curriculum workers and encourage discussion of the general issues of curriculum development and implementation. Curriculum designers, teacher trainers and students of curriculum theory should find this document a useful basis for discussion. Stopping short as it does of 17+, YTS, NTEI, BTEC, Education for Capability etc, it provides an oasis of reflection for those about to plunge into newer curricular ventures. In more or less coinciding with the transformation of the Schools Council into two separate councils, its publication also provides a nice comment on the potential and actual influence of curriculum development in one sector of education upon another.

Yours faithfully

Jack Mansell

JACK MANSELL
Director

Board of Management

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The Further Education Curriculum Review and Development Unit (FEU) is an advisory, intelligence and development body for further education. It was established in 1977 by the Secretary of State for Education and Science to make possible a more co-ordinated and cohesive approach to curriculum development in FE by:

1 reviewing the range of existing curricula and identifying overlap, duplication and deficiencies

2 determining priorities for action to improve the total provision and suggesting ways in which improvement can be affected

3 carrying out specific studies, helping with curricular experiments, and contributing to the evaluation of objectives, and

4 disseminating information about the process of curriculum development in FE.

The publications in this series of Reports are intended to inform teachers and others and to stimulate professional discussion about matters of concern to the FE service. The views expressed are those of the authors and are not necessarily those of the Unit's Board of Management. A limited number of extra copies of this report are available from

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The Project Brief

The Keele Curriculum Styles and Analysis Project was conducted under the sponsorship of the Further Education Curriculum Review and Development Unit to undertake a

> "Review and synthesis of curriculum developments in non-FE sectors of education".

The task accepted for the Project was

i. The analysis of selected curriculum developments within secondary and higher education to identify (a) styles and underlying strategies and the factors and constraints that have affected their success, (b) the relevance of such findings to curriculum work within FE.

The Project's location was the Department of Education, University of Keele, Staffordshire, and the major part of the work on which this report is based, was carried out between 1.1.79 and 31.3.80. The Project team members were as follows:-

Joint Directors:	Professor R F Kempa
	Mr I F Roberts (also acting as Project Co-ordinator)
Research Fellow:	Mrs G Heathcote
Secretary:	Mrs M Millar (1.1.79 – 31.12.79)
	Mrs M Hopley (from 1.3.80)

Consultative Committee

As part of the Project's operation, a consultative committee was established "to advise the project team on specific aspects of their work and to promote the link between the Project and FE institutions". The membership of the Consultative Committee was as follows:-

Mr J Mansell	Head of the Engineering Department, Paddington College, London; latterly, Director, Further Education Curriculum Review and Development Unit
Mr T G Melling, HMI	Director, Further Education Curriculum Review and Development Unit, 1977-1980
Dr R Oxtoby	Vice-Principal, Garnett College, Roehampton Lane, London.
Mr K Wild	Adviser for the 16-19 Staffordshire Education Committee, Stafford.

Acknowledgements

We would like to thank the following for their help and support for our work:-

i. The members of the Consultative Committee, in particular the two Directors of the FEU, Mr Geoffrey Melling and Mr Jack Mansell, who gave us much valuable guidance and feedback at different stages of the Project.
ii. Mr Howard Hilton of the Faculty of Education, North Staffordshire Polytechnic and Mr Clive Kendrick of the Crewe and Alsager College of Education for facilitating access to various curriculum materials in their institutions.
iii. The many individuals in the FE Colleges who responded to our questionnaire thus giving us valuable information on the problems faced by practitioners within further education with respect to a number of curriculum areas.

Gay Heathcote
Richard Kempa
Iolo Roberts

Chapter 1 — The Project

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The Project

The Purpose and Rationale of the Project

1. In its first newsletter (October 1977), the Further Education Curriculum Review and Development Unit identified the need "to review the range of existing curricula and the identification of overlap, duplication and deficiencies". The Keele Project took as its basic premise the view that curriculum development work undertaken in recent years within other sectors of education has given rise to experiences and materials which could be of considerable value and relevance to further education. In particular, curriculum work undertaken at the secondary level had employed different styles and strategies of curriculum development which, it is argued by the Keele team, merited detailed examination and evaluation in terms of their potential for curriculum work within further education. To a lesser, but not insignificant extent, this is also true of innovations within higher education.

2. Most of the secondary level curriculum work was conducted under the auspices of either the Nuffield Foundation or the Schools Council. The projects undertaken are too numerous to be listed here, but many of them are well known and several are referred to in detail in this report. In relation to the higher education sector, curriculum development has been the result mainly of the work of the Nuffield Foundation Higher Education Project, for example in the form of the HELP projects in Biology and Physics, and of smaller groups operating within individual institutions of higher education.

3. It is our contention that the experiences of and insights into the processes of curriculum development which have been gained in the secondary and higher education sectors have considerable "transfer value" for the FE sector, if they can be properly identified and described. Therefore, we saw as an important research task the *review and analysis of selected curriculum activities and projects within secondary and higher education* in terms of:-

i. the styles and strategies employed in them and the factors and constraints that affected their success;

ii. the relevance and transferability of findings from (i) to curriculum work within FE.

4. As the chief outcome of this type of review we saw the production of a major report on curriculum development styles, strategies and experiences within secondary and higher education, analysed and evaluated in terms of their relevance to the FE sector. The purpose of the report, it was envisaged, would be

> "to provide information and guidelines on curriculum planning for potential curriculum workers within the FE sector".

5. From the outset, the project activities were planned as a two-phase operation. For the first phase, regarded essentially as a "preliminary" or "formative" phase, a broadly based survey of a wide range of different curriculum projects was planned. The chief aim of this was to identify major features and characteristics with respect to which the curriculum projects varied, so that an "informed" selection of variables and projects could be made which would subsequently receive detailed attention in the main phase of the study.

The Preliminary Phase of the Study

6. Our initial thinking suggested that, as far as possible, the projects to be used as a basis for the broad 'overview' should meet two criteria:-

a. their target population should include pupils in the secondary age range, it being considered that such projects would probably be the ones most likely to provide information of relevance to the FE sector.*

b. the projects should relate to one or other of the following subject areas:-

i. *Science/Mathematics.* Major significance was attached to this because of its importance in the context of both vocational and general education within FE.

ii. *Craft, Design and Technology.* This is a domain of importance in the context of

* Subsequent developments within FE, viz. the increasing number of young students and students of low academic ability entering the colleges, have justified the initial adoption of this criterion.

both general and vocational education in the technical and non-technical sense.

iii. *Humanities/General Studies.* This was considered to be an area of increasing importance in the provision of education for the 16-18 age range.

iv. *Language and Communication.* This is an area of much importance, but has until recently received little attention in the form of curriculum work.*

An Overview of Selected Projects

7. Following the decision about the broad curricular areas to be covered, some 45 curriculum projects designed mainly for the secondary sector (see Appendix 1), were examined with respect to the following characteristics:-

a. *Selected Factual Characteristics,* especially the age and ability range of the learners for whom a project was designed;
subject area or areas covered;
orientation of a project, ie. whether the project was concerned primarily with general education or whether it was orientated more towards personal development or the transition from school to work;
nature of the assessment and certification associated with it.

b. *The Educational Purpose and Justification,* ie. the pressures (political, social and educational) which led to the setting up of a project and its intended foci of influence (eg. whether the project aimed at changing curricular content and/or teaching approaches or whether it sought to bring about changes in the role perception and identification of teachers and of taught).

c. *The Organisation and Style of Curriculum Development* employed in a project, with particular reference to the modes of development work, teacher preparation and the implementation of the curriculum.

d. *The Characteristics of the Curricular Materials* in terms of main foci of influence (linked with b);
organisation of curricular content;
instructional approaches used;
types of material produced.

e. *The Extent and Mode of Evaluation* to which the project was subjected.

The justification for the inclusion of the foregoing characteristics in the preliminary analysis of projects arises from a consideration of the curriculum innovation process as a whole and especially the types of major decision involved in it.

8. The process of *CURRICULUM INNOVATION* may be thought of as comprising a series of distinct but overlapping phases, which may be characterised as follows:-

i. *INITIATION PHASE:* During this phase, the major needs or demands to be met by a curriculum development project are identified and articulated. The broad educational intentions to be associated with a project are normally also identified during this phase, although their translation into more precise and operational statements of intent is not usually undertaken at this juncture. Also, general decisions about the style of curriculum development to be adopted are taken as part of the initiation phase;

ii. *DEVELOPMENT PHASE:* This is the phase during which the new curriculum is developed and at the end of which the new "curriculum package" (with all materials required for the implementation of the curriculum) is available for adoption and implementation. Important decisions to be taken during this phase are concerned with the precise educational intentions of the development project, the selection, rejection and organisation of subject matter, the instructional (teaching) approach to be adopted and the nature of the learning experiences to be created;

iii. *DISSEMINATION PHASE:* In this phase, information about the curriculum project is communicated by the curriculum

* Due to the limited number of projects directly concerned with Language and Communication, categories iii and iv were subsequently combined under the title Humanities/ Communication Area.

developers and/or other agents to the teachers as the potential users of the new curriculum. This is on the assumption that the curriculum users are not actually the curriculum developers, as is the case whenever a curriculum is developed by a "central team" for use by a wider group of teachers. In this kind of situation, the effective communication between developers and users about the philosophy and intentions underlying a project, as well as about its actual content and structure, is an important prerequisite for its successful adoption and implementation;

iv. *ADOPTION AND IMPLEMENTATION PHASE:* Adoption refers to the decision taken by a teacher, group of teachers or an institution to use a new curriculum (eg. to accept it for a particular course or set of courses); *implementation* denotes the actual use of the curriculum and associated materials in the teaching of students. However, the use of curriculum materials in a teaching programme does not provide a guarantee that the curriculum is implemented by an institution in accordance with the intentions of the curriculum developers. Recent studies have provided ample evidence of this kind of "mismatch" between the actual and intended mode of using curricula. (1) The danger of this happening is most pronounced if curriculum developers and curriculum users are different groups of people.

9. The tasks which are central to curriculum innovation are those relating to the development phase, for it is the development of curricular materials in their broadest sense that is the fundamental component of the innovation process. Recognising that this must apply to the range of curriculum work that will have to be undertaken within the FE sector and its institutions, we decided in our analysis of curriculum projects to pay particular attention to factors and issues concerning the development phase itself.

10. For the initial analysis of the curriculum projects, we had to rely almost entirely on brief reports and outlines of the projects: the detailed scrutiny of project materials would have been too time-consuming and, hence, seemed unjustifiable in terms of the overall intentions for this Project. Thus, we were unable to check the validity of the claims and statements contained in the brief reports, etc., used as our resource materials. Despite this limitation, the initial analysis yielded much useful information not previously available and the three Analysis Grids which resulted are included as Appendix 1 to this report. (Readers are requested to note the format of these grids is basically unchanged from that of our original working documents; they should thus not be regarded as definitive documents.)

The Main Phase of the Study

11. The overview analysis of the curriculum projects (see previous section) revealed four aspects in which major divergencies and variations between projects existed. These were:-

i. the ways in which a project's educational intentions and purposes can be formulated and the consequences of adopting different modes of expressing educational intentions for the character of the innovation;

ii. the organisation of curriculum content, especially in relation to the issues concerning the development of "integrated" curricula;

iii. the range and dimensions of instructional procedures to be considered in the planning of teaching approaches and learning experiences;

iv. the evaluation and assessment of curricular materials, and in particular, of students' learning outcomes in different areas.

Given the importance of these key issues in curriculum development work, the Project team (in agreement with the Consultative Committee) decided to focus on them as the basis of the main study.*

* The importance of the areas selected for the in-depth study was confirmed independently by practising teachers within FE who had been invited to respond to a questionnaire sent out by the Project team in September 1979. Returns to this questionnaire also gave strong evidence of the concern and uncertainty felt in many institutions by many individuals in relation to curriculum development work.

General Procedure Adopted in the Main Study

12. The following procedure was adopted for the further analysis of each key area: in the initial part, a detailed theoretical analysis was made of the area and thereby a theoretical framework developed for the analysis of actual curricula with respect to the area in question. As part of this theoretical appraisal, issues of terminology and semantic interpretation were attended to, often in order to produce a uniform and coherent set of definitions where this seemed necessary.

13. The theoretical framework, once developed, was applied in an in-depth analysis of a limited number of different projects. The projects were chosen because:-

i. they demonstrate varied and contrasting treatment of the curriculum variables selected as the four key issues;
ii. they are distributed across the three broad curriculum areas initially identified;
iii. they exemplify well-developed ideas which have been extensively tried and tested in a variety of institutional settings and which, in some cases, have had the benefit of evaluation and follow-up studies.

14. In all, nine projects or course proposals were chosen:

The Schools Council Integrated Science Project (SCISP)
The Nuffield/Schools Council Humanities Curriculum Project
The Schools Council Design and Craft Education Project
The Open University Foundation Course in Social Science – "Making Sense of Society" (D101)
The School Council Geography 14-18 Project
The Schools Council Project Technology
The Schools Council North West Regional Curriculum Development Project
The Schools Council Integrated Studies Project
The Open University Interdisciplinary Second Level Course – "Art and Environment" (TAD292)

15. None of these projects was analysed in its entirety but rather in terms of its perceived contribution to the understanding of one or more of the four key issues. The Design and Craft Education project, for example, was selected because of its use of broad goals rather than objectives, its ideas for integrated and co-ordinated schemes of community-based work, its emphasis on problem-solving activities, its procedures for encouraging creativity, and its attempts to develop assessment techniques to appraise intellectual skills, attitudes and manipulative skills. The Art and Environment course, in comparison, was chosen because of its rejection of objectives, and its total reliance on experiential strategies and on the notion of negotiated assessment.

16. The above review produced a number of working documents in the form of in-depth studies of the nine projects with respect to the four key issues.* In addition a number of other projects were analysed regarding specific features contained in them.

Structure of the Report

17. As already indicated, the main study was concentrated on an in-depth analysis of four key variables relating to curriculum development *per se*. However, the preliminary analysis also gave rise to some findings about the following aspects:-

i. the purposes of curriculum projects, ie. the range and nature of needs to which they sought to respond;
ii. the style and organisation of curriculum development activities;
iii. the nature of the changes which different curriculum projects sought to bring about and, hence, their intended foci of influence and type of material produced.

18. As it is unlikely that any curriculum development can be satisfactorily conducted without these aspects being considered, we have presented a summary report of our findings on the three aspects in Chapter 2 of this report.

19. Chapters 3, 4, 5 and 6 report on the main part of the research which was the in-depth analysis of

* See Appendix 1.

actual curricula with respect to the following four major areas:-

Aims, goals and objectives and associated curriculum models;
The organisation of curriculum content,
Instructional procedures;
Evaluation and Assessment.

20. As already indicated, these are areas in which course and curriculum developers have to make major decisions as part of their planning and development activity. It might be argued that the fourth of these key areas, Evaluation and Assessment, is not directly related to the curriculum development process *per se*. In principle, this is true. However, any curriculum or course developer has, at some stage, to enquire into the usefulness and effectiveness of his activities and/or products, if only as a basis for improving or modifying his materials. Much of the relevant information is likely to be derived from an assessment of students' progress. Therefore, the inclusion of a section on Evaluation and Assessment in this report is fully justified on practical grounds.

21. Chapter 7, the final section, attempts to summarise the major findings resulting from this study and to explore their implications for the FE sector, in particular with respect to the curriculum and course development tasks which are currently faced within FE.

References

(1) Eggleston, J.F., Galton, M.J., and Jones, M.E. *Processes and products of science teaching* Schools Council Publications Macmillan Education, 1976.

Chapter 2 – Issues Relating to the Formulation and Planning of Curriculum Development Tasks

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Issues Relating to the Formulation and Planning of Curriculum Development Tasks

Introduction

22. In addition to confirming our choice of the four key areas mentioned as the main foci for the detailed curriculum analysis, the preliminary analysis of the projects also gave rise to insights into other aspects relating to curriculum work. Of these, three were considered by us to be of importance in and relevance to the initial formulation and planning curriculum development tasks. These are concerned, respectively, with:-

1. the purposes and justifications for curriculum projects, in terms of the types of need to which they sought to respond;
2. the organisation and style of curriculum development activities;
3. the main foci of influence of different curriculum projects, in relation to the nature of the changes they have sought to bring about and the means (ie. the type of material produced) whereby the changes were to be achieved.

23. Strictly speaking, these topics do not relate to the curriculum development process *per se*. Rather, they concern issues which have to be considered prior to the development of a curriculum. In relation to point 1 above, we might argue that the identification and articulation of the needs to which a curriculum or course is to respond must precede its development. Since major planning decisions (eg. about the organisation of development work and the emphasis to be given therein) will be made in the light of the perceived purposes of the innovation, this needs identification and articulation and is an important initial stage in the curriculum innovation programme.

24. In relation to point 2 above, it is almost self-evident that decisions about how a curriculum development is to be organised and executed have largely to be made prior to the development work actually taking place. This relates not simply to the issues of task assignment, but also (and in particular) to the question of whether the responsibility for development should be vested in a central development team or whether it should be school-based, for example. Essentially, decisions in this area determine the style of curriculum development (and, potentially, also its success).

25. The third issue, that concerning decisions about the main focus or foci of influence of an innovation, is closely linked with decisions about the overall purposes of an innovation. Depending on what these purposes are, the focus of the innovation may be the learner or the teacher. This in turn will determine whether the main thrust of the development is the generation of new teaching materials or the professional development of teachers. This also extends to the question of what types of curriculum materials are to be produced.

26. Although, as previously indicated, the main tasks facing FE institutions lie in the curriculum development area as such, it is unlikely that these tasks can be satisfactorily and purposefully accomplished without consideration also having been given to the three aspects raised above. For this reason, we report in this chapter our summary findings concerning these issues.

The Purposes of and Justifications for Curriculum Projects

27. Curriculum innovation, like innovation and change elsewhere, usually comes about as the result of pressures, overt or covert, emanating from both outside and inside the educational system. Often it is impossible to attribute an innovation to a single pressure or cause, although it is usually easier to identify or suggest major causes underlying a curriculum innovation. What soon becomes clear from the analysis of curriculum projects is that the chief pressures responsible for their establishment are generally not educational in nature, but often are political, economic, social or ideological.

28. In the late 1950s and early 1960s, for example, an overt demand for more and better trained scientific manpower arose, which, it was argued, could be met by higher education institutions only if the students entering those institutions had received a better and more up-to-date science education at school. It was this demand that must be taken as a key factor in the establishment of the early science

and mathematics education projects, notably by the Nuffield Foundation. Although the intentions and purposes associated with these projects were appropriately couched in educational terms, it would be wrong to ignore the political and economic pressures that formed the background to the existence of the projects. Also, the dissatisfaction with the school science and mathematics syllabuses in operation prior to these innovations, especially among many school teachers, would have to be acknowledged as another "pressure"; but it is probably one that worked in favour of the ready acceptance of the new curricula once produced, rather than being a major force in the establishment of the projects.

29. Changes in the social structure or social conditions sometimes give rise to special educational needs which have been responded to by the setting up of curriculum projects. The English for Immigrant Children project, for example, was established to help children with language difficulties. Similarly, the Careers Education and Guidance project aimed to give pupils a realistic foretaste of the types of experience and problem which they would face in working life in the 1970s and beyond, covering topics on both employment and unemployment. A more recently articulated need concerns the Education of Children in a Multicultural Society which a current Keele based project is seeking to respond to.

30. Whilst for the foregoing examples it might be suggested that much of the impetus leading to their establishment came from outside the educational system as such, there are many examples of projects whose existence is due largely to pressures from within the education system. One form in which such pressures have manifested themselves is through the creation and introduction of new school subjects or study areas, or the widening of existing study areas to make them accessible to an increased proportion of the school population.

31. Examples of curricula dealing with new areas include the Design and Craft Education project and the Humanities Curriculum project. The former pressed its claim for the inclusion of the study area in the total school curriculum on the grounds of its potential contribution to the general education of the pupil, whereas one justification for the inclusion of the latter area was that through it the student would become aware of social and related issues and learn to react and cope with them.

32. On the issue of widening the access to certain subjects to an increased range of pupils, we may refer to the science area. After the early development of the Nuffield O level science courses, there followed the Nuffield Secondary Science project which sought to provide science education experiences valid for and pertinent to non-academic "average" pupils. More recently, this has been followed by the LAMP project in science, undertaken under the auspices of the Association for Science Education. This project aims at the less academically motivated pupil (at least in terms of its title) although this might be taken more as a reference to low ability pupils.

33. At the root of this kind of development are, it would have to be argued, pressures emanating from groups within education who seek to achieve wider recognition or influence for their own interest areas. Whilst this reflects a situation of bias and/or "vested interest", the justifications advanced for these claims invariably appear educationally sound and appealing, through perhaps they remain unproven.

34. Changes within the educational system itself have given rise to several new curriculum projects. Prominent here are the projects that have sought to provide meaningful educational experiences for "ROSLA" pupils (ie. pupils who prior to the raising of the school leaving age to 16 years, would have left school at the age of 15 years, but who, after the raising of the school leaving age, had to be educated for an extra year) and the new (ie. non-academic) sixth-former. Such projects include: Nuffield Working with Science; Geography for the Young School Leaver; Mathematics for the Majority; and the Mathematics for the Majority Continuation project.

35. Another "pressure" that is recognisable in the establishment of some curriculum projects is the impact of educational research findings. Particular

reference can be made here to the Nuffield Mathematics Teaching project (1) and the Schools Council Science 5 - 13 project, both of which sought to develop a curriculum package which fully reflected the Piagetian theory of developmental psychology. Other projects have also endeavoured to accept particular learning theories or models (eg. the Schools Council Integrated Science project), but it would probably be wrong to see this as more than a "second-order" decision taken by the developers after the initiation of the project. Thus, one might argue, projects which may be seen as a direct response to educational research findings are relatively rare.

The Organisation and Style of Curriculum Development

36. We can define curriculum development broadly as that phase in the overall curriculum innovation process which is concerned with the production and testing of new teaching and learning materials and/or the generation of novel modes of classroom organisation and teaching. It is useful to adopt this definition in order to make clear that the development of, for example, a new curriculum with new materials is not synonymous with the adoption and implementation of the curriculum in actual teaching. As will be seen below, it is the relationship between curriculum development and curriculum implementation that is an important distinguishing feature of different approaches to curriculum reform work and its organisation.

37. In our analysis of over 40 curriculum projects, three main approaches became identifiable, although in slightly varied forms:-

a. A *centre-periphery* approach, characterised by the curriculum development function being vested in a central team, with only minimal contact with the teaching institutions and teachers as implementers of the curriculum;

b. *School-based innovation*, also sometimes extending to groups of schools or institutions. The essential characteristic here is that the curriculum developers are also the persons actually implementing the curriculum;

c. *Collaborative curriculum development* work, which may be thought of as comprising and combining elements of approaches a. and b. It features a significant degree of teacher involvement in the curricular development, but is conducted under the guidance and in collaboration with 'external' development specialists.

38. In the following paragraphs, these three styles of curriculum development are discussed in greater detail, in order to bring out the advantages and/or disadvantages associated with each:-

The Centre-Periphery Approach to Development

39. The important characteristic of this approach lies in the separation of the functions of curriculum development and curriculum implementation. These functions are undertaken by two separate groups of professionals linked by an often complex communication network, with the developers at the 'centre' and the implementers at the 'periphery'. The communication network may involve the use of newsletters, national conferences, regional workshops, school-based demonstrations, residential courses for teachers and many other modes of communication between developer(s) and implementers.

40. The centre-periphery approach to curriculum development featured prominently in, for example, the early science projects sponsored by the Nuffield Foundation and the Schools Mathematics Project (SMP) and many other national projects. Indeed, it might be argued that this style of development has proved most successful and acceptable for work aiming at national coverage in instances where formal agreement exists or can be reached about curriculum intentions and content and about the educational standards to be achieved. Such agreement basically exists when the curriculum leads to external examinations. Thus, it is not surprising to see that the centre-periphery mode of curriculum development has been extensively used in the case of curricula for courses leading to formal examinations.

41. Of course, this does not preclude the use of the centre-periphery approach in situations other than those concerning national developments. A number of regional projects were conducted on the basis of this model (eg. the North West Regional Curriculum Development project and the Shropshire Mathematics Experiment). However, it might be argued that the more localised a development becomes, the more the conditions for a successful adoption of one of the other styles of development are likely to be present.

42. We can now consider some of the advantages and disadvantages or problems associated with the centre-periphery style of curriculum development. An immediate advantage is that, in the formation of a central curriculum development team, one can bring together people of high professional standing and high expertise in both the subject area of the curriculum and in curriculum development work itself (although the latter type of expertise may initially not be available, as was the case – to some extent at least – in the early Nuffield projects). Through the choice of highly qualified manpower for the development, one can ensure that the development is informed of research and observation of good practice and that it proceeds in a professional manner.

43. The potential disadvantage of the centre-periphery mode of operation lies in the separation of the practising teacher as potential curriculum implementer from the curriculum developers and the development process as such. Although the developers will endeavour to inform teachers about the intentions and features of a curriculum, thereby facilitating the adoption and implementation of the curriculum, much evidence has accumulated to suggest that this communication process is not always fully effective. The intentions of an innovation are frequently misunderstood by the teachers or modified or distorted by them. The result is that the curriculum is not implemented in the form in which the developers had intended for it to be implemented.

44. This might be due to a variety of factors: curriculum developers' inability to express curriculum intentions unambiguously; or their inability to take into account particular institutional constraints under which a teacher works and which require him/her to modify the curriculum; or a conflict between the values of the developers and those held by a teacher; and so on. Whatever the actual reason or cause of a 'mismatch' between intention and practice may be, overall it is the result of the separation of the implementation of a curriculum.

School-Based Innovation

45. The essential characteristic of the school-based (or institution-based) style of curriculum development is that the curriculum developers are also the curriculum implementers. The same group of teachers occupies a dual role: it has extensive responsibility for developing a course (together with appropriate course materials, etc.) and thereafter for implementing it. The main and most obvious advantage of this is that there is every likelihood in this situation that curriculum intentions will be implemented (ie. translated into practice) as initially conceived.

46. The case for this style of curriculum innovation rests largely on the argument and assumption that, given appropriate support and a favourable institutional climate, teachers are in a better position to identify and solve their curriculum problems than are persons who are external to the institution. Especially attractive is the claim that in school-based development work full cognisance can be taken of the conditions concerning, for example, manpower and facilities, as they prevail in a particular school or group of schools. Support, as referred to above, often involves a curriculum consultant or specialist from outside to work with groups of teachers who seek to develop their own curriculum materials. This was the case, for example, in the North West Regional Curriculum Development project. Generally also, school-based curriculum work has required some outside funding (from, for example, an LEA, or bodies such as the Schools Council or the Nuffield Foundation), but usually the sums needed have been small compared with the sums needed to support centre-periphery type projects. Whether school-based work is more cost-effective than centre-periphery

innovations is difficult to ascertain though.

47. There is little doubt that school-based curriculum work can be very successful in the following instances:-

i. when the need for curriculum materials exist which has to take cognisance of localised situations or content;
ii. when the chief focus of the innovation is on pedagogical practices rather than curriculum content.

48. In relation to point i above, the project on Modular Courses in Technology, based on Avon and Hertfordshire respectively, offers a good example. In this, groups of teachers produced a five-term (modular) course, the content of which sought to reflect the nature and interests of local industry. Thus, the courses produced in the Avon area included content on aero-dynamics and on optical instruments, both the concerns of major industries in the Avon area. In relation to point ii above, reference to the Ford Teaching Project (2) is appropriate. In this teachers from different schools, concerned with the teaching of different subjects to pupils of different age and ability levels, collaborated in developing knowledge about the practice of enquiry-based teaching.

49. School-based curriculum development work has the advantage of eliminating the 'gap of understanding' between curriculum developers and implementers which has been characteristic of much centre-periphery development work. However, it can run into difficulties of a different kind. The smaller the scale on which it is conducted, the more idiosyncratic the innovation is likely to be. This can give rise to a lack of uniformity in educational practices between institutions and hence, to a fragmentation of curriculum provision. The quality of the innovation, particularly if it involves the production of materials, might be inferior to that using a centre-periphery style because the resources for curriculum work, both financial and human, might be inadequate; the centre-periphery approach to development has the potential advantage of harnessing the efforts and expertise of a small team of skilled developers for the benefit of the system as a whole in a way which the school-based style finds difficulty emulating. Moreover, the school-based approach is likely to involve teachers in spending more time on the process of innovation compared with adopting the ready-made materials of the centre-periphery type and can lead to duplication and unnecessary overlap of provision.

Collaborative Curriculum Development work

50. The collaborative style of curriculum development can be conceptualised as a style which, if located on a continuum having the centre-periphery at one polarity and the school-based at the other, would cover much of the middle ground in between. It subsumes a "large variety" and degree of collaboration but always involves some kind of co-operative activity between teachers and outside experts in *both* the development and the implementation of a curriculum innovation. Some of the teachers, but not all, will be involved in both processes. Thus, the group of implementers, whilst numbering more than the group of developers, will nevertheless have some members in common.

51. In contrast to the centre-periphery style of development, collaborative development goes beyond the nominal consultation with teachers in that it makes a real attempt to involve more teachers in all or many aspects of the curriculum innovation. This can be illustrated by the Geography 14-18 project project which attempted collaborative curriculum development on a national scale. The project produced, with the help of school-based teachers organised into consortia, exemplary teaching materials which those teachers (and others most involved in the development work *per se*) used, adapted or developed further at the point of implementation. A similar pattern of work was adopted for the Nuffield Working with Science project where, again, groups of teachers collaborated with a central project officer/co-ordinator in the development of teaching materials.

52. For the collaborative style of curriculum development work to be effective, an organisational framework is required that allows groups of teachers to interact and work together among themselves and

with outside curriculum consultants and experts. Such an organisational framework can frequently be provided by teachers centres, operated by LEAs, colleges and higher education institutes, with LEA advisers, lecturers and even HMIs assuming major responsibility for the organisational aspects of the development work. Although this might lead to some of the basic tenets of the "top-down" approach of the centre-periphery style being in evidence in the collaborative style of development also, the latter style has the intrinsic advantage of providing a better communication with teachers and thereby lessening the gap between curriculum intentions and actual practice.

53. A further benefit of the collaborative approach to curriculum development derives from the close contact between teachers as curriculum workers and curriculum experts which this style of innovation entails. This benefit lies in the enhancement of teachers' understanding of and, possibly also, their commitment to curriculum development. Additionally, it is possible in collaborative development work to take account of local variables operating in schools more adequately than can be done in centre-periphery developments.

54. A potential disadvantage associated with the collaborative style tends to be that it involves large numbers of individuals and that, as a result, decision-making is slow and a proper co-ordination of activities difficult to achieve.

55. The collaborative approach to curriculum development has been successfully employed in a range of projects which have aimed at the development of materials for courses which were not initially linked to external certification. Projects designed in response to the raising of the school leaving age and aimed at average and below-average ability learners fall into this category (eg. Geography for the Young School Leaver and – as already indicated – the Nuffield "Working with Science" project). The approach is undeniably attractive and should prove suitable not only for the development of more academic curricula, but also, and in particular, for development work in the "personal development" area currently under consideration in FE and other sectors of education. In particular, the more significant degree of direct teacher participation in the innovation process which characterises the collaborative style, as compared with the centre-periphery approach, promises that curricular intentions are matched by actual curricular practice more strongly than has been the case in many of the centre-periphery projects.

Foci of Influence of Curriculum Projects

56. Although each curriculum project aims at bringing about an improvement in learning and teaching, the means and strategies whereby such improvement is brought about (or intended to be brought about) vary considerably. Already reference has been made to the different styles of curriculum development adopted by different projects. In this section attention is given to the foci of influence chosen by different projects and, linked to this, the types of material and activity generated by the projects.

57. In a broad sense, curriculum projects have tended to bring about change in one or more of the following aspects:-

a. The *content* of a curriculum, for example, by incorporating in it new knowledge or by reappraisal and restructuring existing knowledge into what for the learner may be more meaningful patterns;
b. The *pedagogical strategies* employed by teachers, for example, through the adoption of new or different teaching approaches and/or the introduction of novel learning strategies (eg. self-instructional procedures);
c. Teachers' *role perception*, in the sense that teachers are encouraged to re-examine and reappraise their professional role and function. Although this serves as a means of bringing about changes in teaching procedures, it is appropriate to discuss it separately from point b. above.

58. The separation of the foregoing three aspects from one another is primarily a matter of convenience and should not be interpreted as implying that individual curriculum projects were concerned with

merely one of these aspects. Nevertheless, it is often possible to identify for a project its *main* focus of influence, and in this sense projects become classifiable in terms of the above listing.

Change in Curriculum Content as a Focus of Influence

59. The term 'content', as used in this context (see also paras 109-111), refers not only to a 'corpus of knowledge' as associated with a particular subject or group of subjects, but also includes those 'processes' (eg. of enquiry) which might be held to be characteristic of the subject or group of subjects. Thus, 'content' can be thought of as having a 'knowledge dimension' (embracing factual knowledge, concepts, theories, etc.) and a 'process dimension' (embracing the procedures and activities typical of a subject or discipline).

60. In a substantial proportion of curriculum projects developed for the secondary education sector, the rethinking or reappraisal of curriculum content has been a central concern. This has involved, for example:-

i. the up-dating of curriculum content, one of the predominant features of the early Nuffield GCE O level and A level curricula;
ii. the modernisation of curriculum content, as was achieved by the formulation of 'modern mathematics' programmes to replace the 'traditional' ones;
iii. extending certain subject areas to incorporate knowledge from other, hitherto separate subjects (the Design and Craft Education project, for example, attempted to broaden the scope of craft education to link it to the design process);
iv. the reappraisal of knowledge and processes characteristic for a group of subjects so as to bring about an "integration" or "co-ordination" of the subjects (as, for example, the Schools Council Integrated Science project brought about a synthesis of aspects of biology, chemistry, geology and physics);
v. the introduction of entirely new content areas into the curriculum, as was the case, for example, in the Integrated Studies project (introduction of aspects of ethics and anthropology) and in the Project Environment (covering ethical and environmental issues).

61. As already indicated, few projects, if any, have seen their task to be solely in the content domain; frequently changes in teaching approach have also been a major concern. Nonetheless, the content area has been the main focus of attention.

62. In attempting to bring about changes in curriculum content, curriculum development has chosen as its target population either the teacher or the pupil or both, and this is reflected in the type of material produced by the projects. Where the teacher is the main target for influence, the materials developed or provided have tended to be teachers' handbooks and guides and "resource materials" which the teacher can use as he sees fit. The purpose of handbooks and guides is often to extend and develop teachers' subject knowledge in areas relevant to his teaching duties. As must be obvious, such materials are indispensible as a basis for up-dating curriculum content or for introducing new subjects or subject areas into the teaching curriculum.

63. Whilst some projects have limited themselves to aiming at teachers in the way just indicated, others have focused their attention directly at the learners: the usual medium for this is the production of pupil or student materials, especially course books. Other materials include, for example, work or activity sheets, laboratory books, problem books and "background" readers, but these can often be used by teachers in a fairly flexible way and thus may be regarded as learning resources rather than as formal course materials.

64. It is inevitable that, if a curriculum project provides formal course books for use by pupils/students, teachers have little scope for independent decisions about the content of their courses. This may be seen by some to be a disadvantage in that it conflicts with the notion of teachers' professional autonomy. From a different

viewpoint it may appear as an advantage because it enables him to put into operation well developed and tested materials.

65. Even when curriculum projects have aimed at the pupils directly, through the production of course books or similar materials, they have invariably also provided teachers' guides giving teachers the academic background information appropriate to the curriculum as well as outlining the pedagogical procedures to be adopted. Thus, both pupil and teacher become the targets of the curriculum developers' influence.

66. It would appear that in development work which, at least in part, aims at changing curriculum content, the production of books, guides, worksheets and other learning and teaching aids, is an important feature. This is as true for centre-periphery developments as it is for school-based curriculum work.

Pedagogical Strategies as a Focus of Influence

67. Most curriculum proposals incorporate recommendations about how the teaching should be conducted and about the nature of the learning experiences to be provided for the learner. Insofar as this kind of concern is accepted by a project, it clearly aims at influencing or prescribing the pedagogical procedures and strategies to be employed by teachers. To exemplify this, one may make brief reference to the early Nuffield projects which, in addition to up-dating curriculum content, advocated a pedagogical strategy which was based on guided discovery learning, a strategy which became widely known as the "Nuffield approach".

68. In advocating particular pedagogical strategies, the curriculum developer clearly holds assumptions about which instructional procedures are most conducive to fulfilling the intentions of his curriculum. For example, the advocacy of guided discovery learning is based on the assumption that this instructional strategy leads to a deeper understanding on the learner's part of what is to be learned than a teaching approach involving expository teaching. It is perhaps not inappropriate to point out here that often the recommendations made are based on *assumptions*, rather than research findings. Indeed, at times the assumptions held about the effectiveness of particular pedagogical procedures are at variance with the results of research!

69. A variety of projects has attempted to draw teachers away from the traditional expository methods of teaching towards the use of discovery or enquiry-based learning. Other projects have sought to promote experiential learning situations or have recommended teaching approaches which shift the control of learning outcomes away from the teacher to the pupils, thereby making pupils' learning more open-ended. In yet other projects, the use of self-instruction, as opposed to teacher-based learning, has been advocated. These strategies are described in Chapter 5, of this Report.

70. In all these instances, the adoption of the recommended instructional strategies requires teachers to extend their pedagogical repertoire. For this to be achieved, the curriculum developer provides guidelines and advice to teachers. In the case of the centre-periphery developments, these tend to be contained in teachers' guides or manuals, although in-service courses are also sometimes used as a means of introducing teachers to novel instructional procedures.

71. It is appropriate to point out here that the communication of ideas about instructional procedures by means of teachers' guides and other printed information has generally proved rather ineffective. As already indicated in paras 36-55, centre-periphery developments have generally not been successful in bringing about changes in the pedagogical approaches used by teachers, despite their unquestionable success in introducing changes in curriculum content. School-based or collaborative approaches to curriculum innovation hold out far more promise and potential in this respect.

Teachers' Role Perception as a Focus of Attention

72. In a limited number of curriculum projects, the change advocated in the pedagogical activities of

the teacher appear so radical that it requires the teacher implementing the innovation to reappraise his or her perception of the teaching function and to adopt a significantly changed role. It is this role adjustment which distinguishes this form of change in pedagogical activity from that discussed in paras 67-71.

73. An outstanding example of this is the Schools Council Humanities Curriculum project which requires the teacher to abandon the role of a provider and selector of information and instead assume the role of a "neutral chairman" who facilitates pupils' learning in a way in which teacher and pupils are equal or near-equal partners. This latter aspect is reflected in the fact that the curriculum resource materials produced by the project are for use by both pupils and teachers.

74. It is evident that under the circumstances just outlined, the customary role of the teacher no longer exists. The project requires the teacher to adopt a role that is different from that to which he may be used; it is a change that goes beyond the mere adoption of a different teaching strategy which would leave intact the teacher's traditional role in the classroom. It is, of course, not simply the teacher's role that is changed, but the learners' role likewise undergoes change. Generally in these cases, the curriculum developer aims at influencing the relationships between teacher and taught. Thus, the focus of attention has been shifted from the content of the curriculum and teaching approaches employed to the personal relationship between pupils and teacher.

Conclusions

75. Our intention, in writing this chapter, has been to draw attention to and discuss three issues relating to the planning of curricular projects which, although not part of development work *per se,* should be considered by the potential curriculum developer. From our analysis, it appears that in the past rather too much emphasis has tended to be given from the outset of development projects to actual curriculum devlopment tasks, at the expense of a deep and thorough consideration of the issues raised in this chapter. It is our view that curriculum and course development should not be embarked upon without the prior articulation of:-

i. the needs to be met or existing deficiencies to be remedied by the innovation;
ii. the organisation and style of the development activity envisaged;
iii. the focus of the influence to be exerted by the innovation, whether student, teacher or both.

76. Although the broad findings presented in the foregoing are the result of our analysis of secondary level projects most of which were "national" projects, we feel that they have some "transfer" potential to be FE sector, albeit in a somewhat modified form. For example, it is our view that problems arising from a centre-periphery approach to development need not be confined to large-scale national or regional developments: they can occur intra-institutionally if a course or curriculum development task is tackled by a relatively isolated subgroup of the institution's staff. Confinement of development work to one institution is hence not a guarantee that communication problems between developer and implementer are avoided. Thus, in institution-based development work, questions of implementation are no less important than in national or regional projects.

77. There is no way in which the findings from our analysis can be translated into simple rules and guidelines to be observed by FE curriculum workers. Each course or curriculum development task arises in its own particular context and requires its own particular solution. Nevertheless, we hope that the potential developer is helped in his task by his awareness of the issues dealt with in this chapter.

References

(1) Nuffield Mathematics Teaching Project 1964-72. Director: Professor G Matthews. Centre for Science Education, Chelsea College, University of London, Bridges Place, Fulham, London SE6 4HR
(2) Ford Teaching Project. Centre for Applied Research in Education, University of East Anglia. Subsequently at the Institute of Education, Shaftesbury Road, Cambridge CB2 2BX.

Chapter 3 – Aims, Goals and Objectives in Curriculum Development

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Aims, Goals and Objectives in Curriculum Development

Introduction

78. Our concern, from the outset of planning this analysis project, was that the findings resulting from it should be "decision-oriented"; that is, help potential curriculum and course developers to consider and make informed decisions about matters directly relating to such development work. We felt this to be particularly desirable since, in our view, curriculum decisions taken in the past have often been the product of a mere acceptance of prevailing view and fashions, without these being adequately questioned. Only in this way can we understand why, over a significant period of time, curriculum projects almost automatically adopted discovery learning procedures as the only "acceptable" educational strategy and, likewise, why so much of the early curriculum work was undertaken within a framework of prespecified educational objectives.

79. If lessons are to be derived from the experiences of past curriculum development work, it is important that in the first instance the range of conceptions and practices should be unfolded that is embedded in these developments. Thereafter, the conceptions and practices, as they emerge, can be subjected to detailed examination as to their characteristics, their strengths and weaknesses, and their appropriateness for different purposes and under different conditions.

80. We have adopted this approach and applied it to four major areas which to us seemed to be primary decision-making areas in curriculum and course development work. The choice of these areas reflects our own prioritasation; it also reflects the fact that the scope of our work had to be restricted to a limited number of issues, in view of the time and manpower available for the conduct of this study.

Aims, Goals and Objectives and Associated Curriculum Models

Background Comments

81. Education is a purposeful activity, and the curriculum is the main means whereby the purposes of education are achieved. Therefore, curriculum developers make determined efforts to communicate their own conceptions of the curriculum intentions associated with their projects. The analysis of a wide range of project materials indicates that these intentions are frequently expressed in one of the following two ways, although a mixture of the two is often prevalent:-

i. the curriculum developer specifies the learning outcomes, in terms of skills – intellectual and manipulative – and attitudes, which the curriculum seeks to foster and instil in the learner. The degree of precision with which such skills and attitudes are specified and the degree of behaviourism which is associated with such specifications does, however, vary considerably. We propose that the terms "aims", "goals" and "objectives" be used to denote statements expressing different degrees of precision and behaviourism (see paras 84-90).

ii. the curriculum developer specifies the pedagogical procedures to be adopted by teachers and/or the conditions under which learning is to occur. The establishment of such procedures/conditions may require the teacher to depart from his/her customary pedagogic practices and involve him/her in a substantially new teaching situation in which new teaching styles and role relationships between teacher and taught have to be adopted. The assumption underlying the specification of the instructional procedures/conditions is that through them certain desirable characteristics on the students' part will result, although these are generally not explicitly identified.

82. Figure 1. summarises the two main ways of expressing educational intentions. Our concern in this section of the report is primarily with aims, goals and objectives as statements expressing students' learning outcomes. Teachers' pedagogical activities are not discussed here in detail since they relate directly to instructional procedures which form the theme of the third key issue examined in this report.

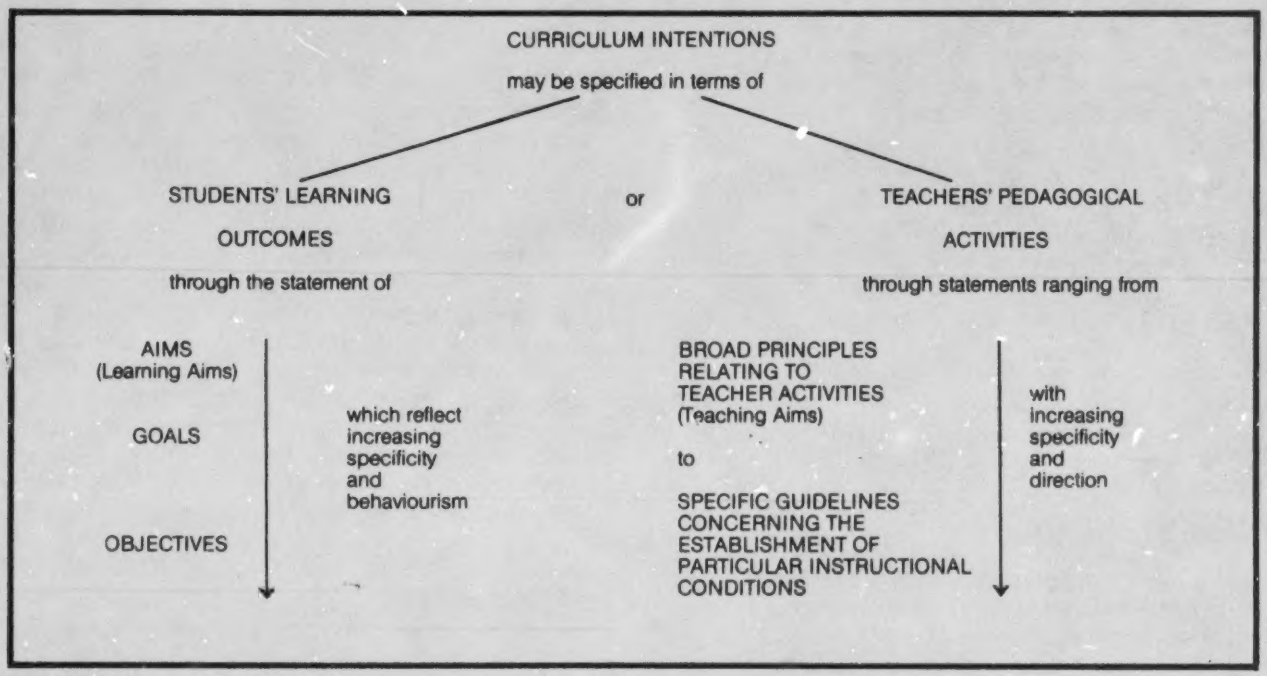

Fig. 1: Ways of Expressing Curriculum Intentions

83. The structure of this section is that in the first part the terms aims, goals and objectives are defined and their importance in the curriculum context discussed. This is followed by a concise analysis of the range and nature of statements of educational intentions found in different curriculum projects. In the second part of this section, a discussion and analysis are presented of the role of the two different forms of stating educational intentions in actual curriculum design and planning. As will be seen, the two forms give rise to two different models of curriculum development, the *Objectives Model* and the *Process Model,* respectively. These models are described and examined from a theoretical and practical point of view.

Basic Definitions

84. The terms "aims", "goals" and "objectives" are widely employed to refer to expressions of educational intention but, unfortunately, no uniformity exists as yet in their use for different types of statement. For the purpose of this analysis, at least, it is desirable to apply a coherent set of terms to characterise expressions of intentionality across a wide variety of different subjects and combinations of subjects. The following definitions and distinctions were adopted:-

Curricular aims

85. These are seen as generalised statements of intent which may relate to the whole or part of a curriculum. Not infrequently, such statements reflect philosophical or educational beliefs and values. Statements of aims are generally vague and tend to have little operational value (descriptively or prescriptively) in relation to the planning, development and implementation of curricula. They can, however, act as a "reference" against which the tenability of more specific statements of intent (eg. curricular goals and objectives) can be appraised.

86. As has been suggested, statements of curricular intentions are classifiable into those relating to the learner and the educational outcomes expected of him and those which specify particular instructional conditions to be established by

teachers. In accordance with this classification, we may distinguish between *learning aims* (ie. those which express students' learning outcomes) and *teaching aims* (ie. those describing pedagogical processes and procedures). To avoid undue confusion in the use of the term aims, we propose that the term be qualified as indicated in the preceding sentence, whenever both types of aim appear and that, without such qualification, the term be used to denote student-related (learning) aims only. This is the practice adopted here.

87. Our concern here is solely with curricular aims, not the broad aims that are applied to the overall process of education and which have their origin in political and philosophical thought.

Objectives

88. These are relatively narrow and precise statements of educational outcomes expected of the *student.* They are often couched in terms of the sought-for overt behaviours (abilities, skills and attitudes) and may even include a specification of the level of performance expected of the student. The specification of students' learning outcomes in behavioural terms implies that the students' performance is measurable. The degree of precision with which an objective is stated usually depends on the context in which the objective occurs. In curriculum work, for instance, a subject-based objective (eg. "the ability to solve quadratic equations") will be relatively broad in scope and afford some flexibility for teacher mediation and interpretation. In contrast, objectives formulated in the educational technology context (eg. for programmed learning materials) tend to define learning outcomes in a very specific and often narrow sense. It is, therefore, important to be aware of the differential demands made by the context against which the object is set. However, irrespective of the context, statements of objectives should relate entirely to the learner. For example, the following statement from the Open University course on Technology – Materials Processing, satisfies this requirement:

> "(the student) should be able to describe the principle sources of hydrocarbons and the problems inherent in their characterisation".

Goals

89. These occupy an intermediate position between aims and objectives, at least in terms of the preciseness with which the desired educational outcomes are expressed. They are statements which may summarise the outcomes specified either for a course or for a curriculum as a whole. In comparison with objectives, goals express generalised behaviour expected of the learner. Unlike curriculum aims, goals retain an element of operationality in that they usually point to some ability, skill or attitude which, after suitable further definition, may be translated into a series of more precise objectives. According to this definition, the following statement from the Schools Council Integrated Science Project (SCISP), may be classified as a goal:

> "the ability to organise and formulate ideas in order to communicate them to others".

90. The term "general objectives" has recently been introduced by TEC to refer to statements of educational intent which, in terms of the definitions adopted here can sometimes be described as curriculum goals and in other instances as objectives. We prefer the terminology adopted here because it avoids confusion between different types of objectives, that is, general objectives and specific objectives. For the same reason, we advise against a widening of the meaning of the terms "goals" and "objectives" to notions such as "teaching goals" and "teaching objectives". These are invariably aimed at the teacher and usually specify aspects of procedures and conditions to be adopted or provided in the pursuit of teaching. They represent statements of intended teacher activities, and not of students' learning outcomes.

An Analysis of Statements of Intent in Various Projects

The Use and Function of Aims, Goals and Objectives

91. All the curriculum projects and courses analysed during this study contain some listing of the the educational intentions underlying them, although there is a great variation both in the nature of these statements and their degree of specificity. The

comparison and classification of these statements is sometimes difficult as different curriculum developers use different terminology and give idiosyncratic meanings to identical terms.

92. The general tendency is for statements which, in the terms of the definition given, may be classed as aims, to have the function of "legitimising" a curriculum. They are used to express the general purposes of a curriculum, rather than its specific intentions. Frequently such aims statements are consonant with more general and global aspirations attributed to the educational process as a whole.

93. Because of their general and non-operational nature, curriculum aims are normally only of limited value in communicating curriculum intentions to curriculum users. Where they do assume significance, though, is in curricula which embody and make explicit certain values, attitudes or opinions held by the curriculum developer, particularly where these depart from the "traditional" or established norm. They are, therefore, sometimes used to provoke reaction, stir controversy or stimulate re-thinking about educational values. The Open University course "Art and Environment", for example, uses statements of aims to make public its course development team's conception of the nature of art and art education and art's perceived relationship with the environment. In so doing, it criticises previous and current educational practice. This is evident from the following statement of aims, according to which art education should "enable people to bring to the topic of environment a greater element of imagination and feeling than is usually the case".

94. Similarly, the Schools Council Humanities Curriculum Project claims as one of its aims the development in students of "an understanding of social situations and human acts, and of the controversial value issues which they raise". This statement contains a value judgement insofar as it is both desirable and appropriate that students (in this case, adolescents) should tackle controversial issues in the classroom.

95. Three recurrent themes form the basis of many of the statements of aims contained in the various curriculum projects which were analysed:-

i. promotion of the individual's personal and intellectual growth;
ii. meeting the needs of the individual in relation to his societal and physical environment;
iii. meeting the needs of society itself.

These themes are frequently couched in phrases such as "self-development", "self-development in relation to others", "self-realisation", "preparation for life", "maturity", "citizenship", "autonomy of the individual", "the future needs of young people", and so on. Desirable though these intentions may be, the phrases themselves unfortunately refer to qualities which are difficult to define with precision. Also, since they are presented at a high level of generality and so lack operationality, they can have only limited value in communicating to the curriculum user the actual intentions of a curriculum.

96. Statements of curriculum aims are often followed by, or linked to, statements which have the qualities of curricular goals in that they point more precisely than aims to the learning outcomes expected of the student. The exceptions to this are, of course, those curricula which show a total commitment to the specification of pedagogical procedures and teacher activities.

97. Curriculum goals, when stated, appear to serve two principal functions:-

i. they act as a base from which the curriculum planner can formulate objectives, more specific statements relating to students' learning outcomes. Such objectives often apply to parts or sections of a curriculum, rather than the curriculum as a whole. In this situation, the control over such outcomes remains with the curriculum planner, and the teacher's role is that of an "agent" who seeks to implement the curriculum planner's specific intentions;
ii. curriculum goals may act as a "staging post" at which the responsibility for their translation into more precise specifications of students' learning outcomes is passed from the curriculum planner to the teacher

as curriculum implementer or, in certain instances, to the learner. In this case, goals assume the function of a device whereby the curriculum developer communicates his educational intentions to the teacher who will interpret these intentions in the light of his special situation.

98. Although these functions are closely connected, they appear as alternatives in curricula, the pre-eminence of one or the other depending on a number of variables such as:-

i. the amount of direction which the curriculum planner wishes to impose on the implementing teacher;
ii. the extent to which the curriculum emphasises student autonomy in relation to learning outcomes;
iii. the ability and previous experience of the students for whom the curriculum is intended;
iv. the curriculum planner's perception of the constraints imposed and opportunities offered by the subject matter.

99. These observations can be illustrated by reference to a number of curriculum projects and courses. The Science 5-13 project, for example, specifies 150 statements of objectives which are systematised from 8 goals, all of which arise from a consideration of Piaget's developmental pyschology. A Teachers' Handbook explains the derivation of the objectives to the teacher and gives extensive instructions on the means of realising them. The only area of decision-making delegated to the teacher lies in the choice of activities whereby the objectives can be achieved. In this sense, the curriculum developer exercises a high degree of control over the implementing teacher, as regards the purpose of the education provided for the learner.

100. In contrast, Project Technology does not exercise this same degree of control. It specifies a number of curricular goals, but their interpretation and translation into more specific statements of learning outcomes is the responsibility of the teacher. There is in this project a commitment to student-centred learning and much value is placed on student experimentation; but the extent to which these characteristics actually appear in a particular case will depend on the way in which the teacher exercises his autonomy over the further specification of student outcome from the goal-level base. This is, of course, fully in accord with the curriculum planner's intention which is that the teacher should share his responsibility with the student and that learning outcomes should be negotiated between teacher and student, taking into consideration the age, ability and previous experience of the student and the matching complexity of the problem-posing and-solving which feature centrally in this project.

101. The second function of curriculum goals, indicated above, gains in importance when teachers who adopt and implement a curriculum are themselves expected to act as course planners and developers. The Geography 14-18 project makes this expectation and claims that curriculum goals:-

i. "provide a broad frame of reference within which discussion about the selection of teaching content, learning experiences, teaching strategies and decisions about assessment can take place";
ii. "serve to direct attention to longer-term aspirations which means that teachers, as curriculum planners, have to think hard about exactly what they are trying to achieve";
iii. "make explicit, therefore, the assumptions which underlie the choice of curriculum components, the criteria which teachers use when making decisions about the curriculum and divergent views among groups of teachers which might otherwise have remained hidden".*

102. Thus, statements of curriculum goals can serve as a planning tool for curricula which, although devised at national level (as in the case of the Geography 14-18 project), seek to involve teachers actively in school (or college)-based curriculum development and adaptation. Goals provide a focus

* From "Geography 14-18: a Handbook for School-Based Curriculum Development". In this, the project team refers to "aims", but these represent goals in terms of the terminology adopted here.

for teacher discussion and allow meaningful development work to be undertaken in the full awareness of organisational contraints, teachers' special interests and expertise, existing facilities and other factors which affect successful curriculum implementation.

103. Generally, curriculum developers refrain from specifying what, in the terminology adopted here, may be described as objectives, and instead restrict themselves to the statement of broadly based curriculum goals without detailing them further. The assumption would seem to be that teachers are fully capable of translating such broad statements into objectives having a high degree of specificity. In the case of straightforward cognitive learning outcomes, this assumption appears entirely reasonable: levels of knowledge to be acquired and the skills to be learned in particular subject areas are often agreed upon by teachers. Thus, a statement such as "the student should acquire an understanding of the basic laws of chemistry" may be entirely meaningful to a teacher if a consensus view prevails among chemistry teachers as to what constitutes "understanding" and about what are the "basic laws of chemistry" to be taught at a particular level. To itemise each such law might be tedious and lead to an inconveniently long list of curricular objectives.

104. This argument can readily be extended to other areas of learning and it may be said that often the statement of curricular goals, rather than objectives, suffices in order to convey a picture of curricular intentions to the curriculum user. However, there are instances when no consensus view can be claimed to exist among teachers about how particular broadly-based statements should be interpreted and what knowledge content might be associated with them. For example, the goals of the Schools Council Integrated Science Project state that students should acquire an

> "understanding of the significance, including the limitations, of science in relation to technical, social and economic development".

and

> "be concerned for the application of scientific knowledge within the community".

These are bound to evoke many different reactions and interpretations from teachers. Thus, goals statements of this type would normally fail to convey to potential curriculum users a curriculum developer's intentions in a meaningful and readily interpretable form.

105. Under circumstances like the preceding, curriculum goals do not fulfil either of the two functions referred to above and, instead, assume the qualities of curriculum aims: they express views and sentiments which, it is hoped, will receive common agreement, but which essentially lack operational value. Indeed, one might argue that any attempt to develop these statements into more specific, operationalised objectives would result in an array of statements which no longer find common agreement and approval. This potential danger can obviously be avoided by the curriculum developer by not elaborating his intentions beyond the statement of broadly-based goals. Numerous examples exist to suggest that this is indeed fairly common practice.

106. Referring to the two main functions of goals identified above, the analysis of a wide range of curriculum projects reveals that the first of these functions (goals used as bases from which the curriculum developers formulate objectives) has a much lower incidence rate than the second function (goals introduced as "staging posts" for the curriculum user to develop his own objectives). Even when curriculum planners attempt, as a matter of policy, to translate their curriculum goals into objectives (in the meaning of the term used here), the resulting statements frequently fall short of the requirement associated with genuine objectives, and instead retain the characteristics of curriculum goals (examples of this are evident from the North West Regional Curriculum Development Project). Only in some Open University courses, notably those in mathematics, are statements of curriculum goals followed by detailed specifications of students' learning outcomes which are classifiable as objectives. This reflects the importance of a clear and unambiguous communication of educational intentions to the student in situations where there is no teacher presence (such situations occur in programmed learning, individualised learning, distance learning, etc.) and of a precise specification

of learning outcomes to guide the student in his studies. Even here, although standards of expected attainment are included in the statements of objectives, it is sometimes stated that these indicate only "minimum" attainment and that the interested student should extend himself beyond this level by further work – reading, discussion, attendance at tutorials, and so on.

107. The claim is sometimes made that curriculum aims, goals and objectives represent an important tool for the rational planning of curricula. In our analysis, we were unable to identify any curriculum projects which had fully adopted this approach to curriculum planning. Even those projects which placed much emphasis on the formulation and statement of aims and goals (few proceeded to the formulation of objectives in our sense of the word) did not adopt a totally "behaviourist" outlook and frequently mixed behaviourist and non-behaviouristic statements of intent.

108. If recent curriculum development work is considered in a chronological sequence, a general trend can be noticed concerning the use of aims and goals. It appears that early curriculum projects (those initiated in the early and mid-sixties) leant significantly more strongly towards the specification of students' learning outcomes than many of the more recent projects. This is partly explained by the general movement over this period of time from large-scale national projects producing fully tested, fairly rigidly designed "curriculum packages" to curriculum proposals which a high degree of in-built flexibility and demanding teacher participation in both planning and realisation. Another possible explanation for this trend is that many of the early projects concerned subjects and disciplines which, by the very nature, allow desirable student outcomes to be specified and formulated in terms of goals and objectives. This issue is taken up again in paras 114-130.

An Examination of the Nature of Goals/Objectives Statements

109. An examination of the actual nature of the goals/objectives statements associated with curriculum projects reveals that such statements, despite their variety, can be broadly subdivided into four distinct, but not exclusive categories:-

i. *Goals/objectives statements which express or relate to curriculum content*
It is useful to interpret "curriculum content" as having two dimensions which relate to the *conceptual content* of a subject (ie. its concepts, facts, theories, etc.) and the *processes* (ie. enquiry modes, etc.) as key characteristics of the subject. Statements of goals and objectives which concern the conceptual content of a subject usually express some intellectual ability which the learner is to develop or some intellectual operation which he should learn to perform. Examples of this are the memorisation or interpretation of specific items of knowledge, or particular problem-solving tasks.
Other statements make reference to processes which characterise a particular subject or discipline. Since such processes must be regarded as an integral part of the content (in the widest sense) of a subject, goal/objectives statements referring to them are appropriately included in this category. For example, the goals and objectives of science curricula invariably make mention of the "processes of science", the processes whereby scientific knowledge is developed and arrived at. Likewise in mathematics, curriculum stress is frequently given to mathematical modelling as a process skill to be acquired by the learner.

ii. *Goals/objectives describing intellectual abilities or activities, but in a (relatively) subject/discipline–independent context.*
Usually, these goals imply the transferability of intellectual skills developed in the context of particular curriculum subjects to general situations. This is characteristic of the "Education-through ..." concept frequently invoked by curriculum developers when claiming that the study of a particular subject area can contribute to the development of general abilities and

skills. An example of this is the claim, which is made on behalf of practically every curriculum subject, that the study of it contributes to the development of general intellectual skills in the learner.

iii. *Goals/objectives which specify or describe practical (psychomotor) skills or abilities (usually manipulative) to be acquired by the learner*
In common with the goals/objectives referred to under (i) above, these goals/objectives tend to be closely linked to specific subjects or disciplines (eg. the sciences and the craft/arts subjects).

iv. *Goals which express or imply the acquisition or development of attitudinal (affective) or personal characteristics*
These can be of a wide-ranging nature and may refer to values in relation to society, to others and to the person himself, or to attitudes and personal characteristics which are thought by the curriculum developer to be desirable. Also included in this general category of goals may be statements expressing particular concerns and commitments which curriculum developers may seek to foster in the learner as regards his view of the role of a given subject in a societal setting. A frequent statement of this kind concerns the exercise of social responsibility by scientists and the responsible application of science within the community. It is worth noting that such statements cannot be regarded as entirely affective in nature since they involve a substantial cognitive content.

110. There can be no doubt that the various statements of curriculum intentions associated with curricula reflect the curriculum developers' assumptions not only about the purpose of their curriculum but also about the nature of the subject to which the curriculum relates and about teaching and learning. For example, curricula in subjects which are considered to have a linear, hierarchical structure (ie. involve a progression of concepts from a low to a sophisticated level, as, for example, in science, mathematics and modern languages), a predominance of statements is observed which express the acquisition and use of concepts. This emphasis on concepts tends to be further reinforced when the intellectual ability of the students for whom the curriculum is designed is perceived as high: in general, the higher the ability of the student, the greater is the stress on concepts. This results in a more "academic" curriculum. By comparison, where the goals/objectives statements place greater emphasis on the processes inherent in a subject, this usually points tc a curriculum which has a lower theoretical (academic) orientation and may, therefore, be suitable either for lower ability groups or for younger learners. This is the case in two recent science curricula: the Nuffield Working with Science project, designed for the non-academic sixth former; and the Schools Council Science 5-13 project which caters for junior and middle school pupils of all abilities.

111. Most of the subject-orientated goals expressed in recent curricula lean rather heavily on the epistemological make-up of the subject/discipline to which the curriculum relates. Thus, the emphasis in craft, design and technology curricula is on practical skills and the acquisition of creative skills and aesthetic values, whilst in mathematics, for example, intellectual abilities receive high priority. Subjects such as geography and history stress the understanding to be gained by the learner of the world surrounding him as it has been shaped, and is being shaped, by human events and interventions.

112. Practically all curriculum projects have issued statements of their educational intentions in the form of aims and, frequently, also in the form of goals and objectives. The range and variety of these statements are such that it is beyond the scope of this analysis to present a listing of the major intentions associated with a representative sample of projects. The reader is, therefore, referred to the original project materials for full statements of their aims, goals and objectives.

113. In the light of our analysis of statements of intent presented by curriculum projects, we make the following (cautionary) observations which, we suggest, should be borne in mind when scrutinising

such statements:-

i. Not infrequently, an obvious link between educational intentions expressed by curriculum developers and the nature and organisation of the curriculum materials is difficult to discern. When this happens, it is unlikely that statements of aims, goals or objectives provide adequate guidance to the curriculum user about the outcomes expected of the curriculum. In view of this, the potential user of a curriculum is advised to examine both statements of goals/objectives *and* curriculum materials when assessing the educational intentions associated with a curriculum.

ii. Most curricula claim to contribute significantly to a person's general education, through, for example, the development of social and life skills (including personal and inter-personal skills and "basic skills" such as literacy and numeracy and communication skills) or broad intellectual skills. Although such claims may well be justified, they should nevertheless be viewed with some scepticism since few curriculum projects dealing with specialist areas, provide learning experiences and materials which lead directly to the development of these general skills. For such general skills and abilities to emerge from subject-specific curriculum experience, a high degree of "transfer of training" has to be hoped for. Alas, evidence to support the claim that transfer of learning is wide-spread, is scant It would appear that these skills are frequently referred to in order to indicate the curriculum developer's endorsement of broad and widely accepted educational aims and to help justify the presence of a particular subject in the curriculum as a whole.

iii. Statements expressing affective goals are generally less precise than others and often lack operationality. Such statements are usually supported by recommendations about teaching approaches to be adopted or instructional conditions to be created by the teacher. Underlying this practice is the assumption that the approaches or conditions so specified are an essential prerequisite for the development of the particular affective characteristics in the student.

Two Contrasting Curriculum Models

Some Theoretical Considerations

114. In the introduction to this chapter, reference was made to the two main ways in which curriculum intentions may be expressed by curriculum developers. The first of these involves the detailed specification and elaboration of student's learning outcomes (which are often stated in behavioural terms), whilst the second focuses on the elaboration of teaching approaches and learning conditions to be created by the teacher. Though frequently both forms of expressing curriculum intentions are used simultaneously, it is nevertheless possible to detect biases and orientations towards either the one or other direction.

115. The two contrasting philosophies about how to express educational intentions give rise to two different approaches to curriculum planning which may be referred to as objectives-based and process-based, respectively. Objectives-based curricula are those in which the specification of desirable learning outcomes is central to the curriculum developer's task and where such statements of learning outcomes form an important reference against which the tenability of educational actions in the classroom must be judged. Process-based curricula, in contrast, focus on a clear description and identification of the pedagogical activities to be pursued and educational conditions to be established by the curriculum user, and these are seen as vital for the curriculum to be effective in terms of its broad aims.

116. The salient features of the two models may be broadly summarised as follows:-

The Objectives Model

i. Curricula developed on the basis of this

model always stress intended educational outcomes in terms of learner achievement. These intentions are in the form of aims (learning aims), goals and objectives. In theory, at least, curricular experiences and materials developed for the student will serve the function of leading him to the attainment of these educational goals and objectives, and the success of a curriculum can be gauged from the extent to which the learner acquires the predetermined abilities, skills and attitudes.

ii. Whilst the pedagogical activities of the teacher are sometimes suggested, they do not appear as the predominant feature of the curriculum specification but are mainly seen as means whereby the intended curriculum outcomes can be achieved. However, the implicit assumption is usually that such outcomes may be achieved by different means. However, sometimes the nature of the specified goals/objectives will demand particular types of learning experience to be arranged for the student.

iii. This model is generally associated with subject-centred curricula and, by implication, with curricula employing intradisciplinary (ie. "within-a-discipline") integration (see Chapter 4). Its use is particularly in evidence in curricula where the subject matter involves the hierarchial ordering of concepts (linear subjects), as is the case for most mathematics and academic science curricula, as well as for curricula in the modern languages.

The Process Model

i. The key feature of curricula based on this model is that they focus on teacher activities, pedagogical actions and on the nature of the teacher's role and, in addition, on conditions for instruction to be created. In this way, the nature of the learning experience is defined to which students are to be exposed, rather than the specific learning outcomes to be achieved from them. The assumption underlying this is that the prescribed learning experiences and pedagogical action provide the appropriate means of achieving the broad intentions of the curriculum.

ii. Although in curricula developed on the basis of the process model broad indications may be given of the intended outcomes in the form of aims, curriculum goals and objectives as such tend not to be stated. Implicit in this is the assumption that the outcomes to be derived from the educational experiences cannot be described in any precise way in behavioural terms because the learner may make an unique and personalised response to that experience. This would be the case in relation to, for example, the acquisition of personality values, the development of self-realisation, and so on. In these instances, the attainment of the broad educational intentions can manifest itself in many different behavioural patterns.

iii. The process model of curriculum planning is prevalent mainly in curricula which are designed to teach social and life skills and in which the development of personal values and attitudes is particularly stressed. Many of the humanities curricula reflect this orientation as, indeed, do curricula in which an extensive interdisciplinary (ie. "across-the-disciplines") integration is attempted. In the latter cases, it is generally impossible to arrive at a consensus view about the conceptual content of what would be loosely defined study areas and this would seem to shift the focus away from a specification of desirable student characteristics towards the prescription of teacher activities and pedagogical strategies. Indeed, a bias towards the process model seems in evidence whenever a study area lacks an agreed conceptual content, and this applies generally to "non-linear" subjects.

The Curriculum Models in Use

117. The objectives model and the process model

have both been extensively described in the literature dealing with curriculum change and have attracted their staunch supporters and fierce opponents. However, an historical analysis of the curriculum developments which have taken place during the last two decades in the secondary and higher education sectors clearly indicates that there are dangers inherent in adopting a polarised stance.

118. Much of the early curriculum development work pioneered in the early 1960's by the Nuffield Foundation and the Schools Council was concerned with subject renewal in the face of political pressures to keep abreast of scientific and technological advance. These curricula generally took the form of centrally-devised packages of highly structured materials whose organisation relied heavily on the objectives model. The materials generally included classroom materials and teachers' handbooks which specified student learning outcomes with a considerable degree of precision. In addition, these outcomes were reinforced by examinations which were orientated towards the measurement of these outcomes. The curricula were usually subject-based. Those in mathematics, in particular, tended to focus on the conceptual aspects of the subject, resulting in a theoretical kind of treatment; those in science too emphasised the conceptual and the processes dimensions of subject matter, but with the conceptual aspects usually in a dominant role.

119. The early curriculum projects had aimed at pupils of well-defined levels whose education could be assumed to occur in well-defined conditions and provisions. This situation had made the adoption of an objectives-based approach to curriculum development relatively straightforward. In this relatively little attention was paid by the curriculum developers to the problems of contextual variables, particularly those relating to the "culture" and "ethos" of the educational institution and the constraints under which teachers work and students learn.

120. As the complexity of the educational scene increased through the merger of schools into comprehensive institutions, the widening of ability groups and other organisational changes, the need for curriculum materials emerged which could be used in a more flexible way than those previously developed. This inevitably meant that the curriculum materials had to afford teachers larger areas of discretion than had previously been the case, and allow curricular materials to be significantly modified so that they could be tailored to the contextual variables operating in individual schools.

121. With the emergence of "flexible" curriculum packages (the Nuffield Secondary Science Project is an apt example), teachers assumed more responsibility and it was important that they shared the curriculum developer's conception of the project and implemented it according to the curriculum developer's intentions. There was a growing realisation that there can be no curriculum development without concomitant teacher development, and accordingly, far more importance was attached to gradual controlled change by means of individual development and to teacher participation with curriculum developers on curriculum teams. A rigid adherence to the objectives model had to be foresaken, although its basic advantages in providing a structure for working out content, learning activities, assessment procedures, etc., were readily acknowledged. A somewhat tempered objectives model resulted which, although specifying student outcomes, did so in more generalised terms, the statements often having more the qualities of goals rather than objectives.

122. In the late sixties and early seventies, the main focus of curriculum development shifted towards the design of curricula for non-academic (middle and low ability) groups and those in which a rigorous definition and organisation of subject content was not possible, in some cases because of the non-linearity of the subjects. The result was that the adherence to the objectives model, characteristic of the early curriculum development movement, was abandoned for several reasons:-

i. learning outcomes ceased to be specifiable in view of the diversity of the learners' interests, abilities and aspirations; the main emphasis was hence given to an identification of the types of learning experience to which the learner was to be exposed;

ii. a further reason mitigating against the objectives approach was the increasing orientation of the new curricula towards the teaching of social and life skills and, in certain cases, also towards changes in students' values and attitudes;
iii. the increasing trend towards the participation of teachers in the curriculum development and implementation process at school level placed pedagogical procedures and conditions to the forefront of curriculum planners' thinking; teacher development itself became the key concern.

123. A number of actual projects illustrate and exemplify the above points. The Schools Council Humanities Curriculum project, for example, places stress on the change of attitudes and the teaching of social and life skills. Its originators rightly felt that this teaching could and should not result in pre-determined outcomes on the students' part, but that it should encourage a diversity of different responses and reactions from the students. Hence, the main focus of attention in this project was the educational means and strategies whereby these responses could be encouraged. In other words, the project adopted the process approach to curriculum planning.

124. Even in the sciences, in mathematics and in the craft design and technology area, where curricula which had hitherto concentrated more on vocational and future man-power needs, strong arguments were put forward for the contributions that could be made by these subjects to the preparation of learners for future adult roles and to the acquisition of basic skills, flexible attitudes, self-sufficiency, personal development, and so on. The problem encountered by these subjects was that, whilst the objectives model offered major advantages in relation to the specification of this conceptual and skills content, its proved unsuitable as regards the pursuit of teaching for social and life skills and for the changing of attitudes. Curricula, in which both elements (the cognitive/pyschomotor and the affective side) were strongly represented, solved this dilemma by adopting a mixture of the two models. In some cases, a fairly "balanced" mix of the objectives model and the process model emerged in which broad student outcomes are specified to the level of goals and supported by specification of pedagogical procedures/conditions to be created. For example, this happens in Project Technology and in the Design and Craft Education project where the use of a problem-solving approach is recommended. In other cases, the objectives model was initially adopted, to be progressively "moderated" by the introduction of an increasing specification of teacher activity and a decreasing specification of students' learning outcomes. This is prevalent in integrated curricula. For example, in the Schools Council Integrated Science project, the integrated base is first formed by establishing the communality of the constitutent science subjects on the basis of common conceptual schemes and processes. For this the objectives model is useful. Once the integrated base is established, the intention changes somewhat in the direction of showing the social relevance of science and its contribution to the development of social and life skills. This involves crossing the boundaries of science and entering the domains of the humanities, and some interdisciplinary integration results. Here the objectives model outgrows its usefulness since the solutions that are sought for to a range of real life problems are inevitably affected by students' own value systems. In other words, such solutions are not pre-specifiable in terms of goals or objectives. At this point, the open-ended aspect of the curriculum is at its most evident and the attributes of the the process model come into play. (The Schools Council Integrated Science project is a good example of this kind of "mixed model" approach even though the curriculum developers of the project might well argue that they were espousing an objectives model.)

Conclusions

125. The history of curriculum development shows that objectives-based approach to curriculum planning has distinct advantages in that the purposeful character of education can be overtly acknowledged. The strengths of the objectives model are at their most obvious when students' desired learning outcomes are readily definable in

operationally meaningful terms. This is the case for curricula with a strong "academic" orientation, especially in subjects or subject areas which may be considered "linear" in terms of their conceptual content.

126. However, considerable difficulties arise when the objectives model is adhered to in situations in which personalised responses to learning situations are encouraged or where the emphasis is on development of affective characteristics, in addition to cognitive ones. Basically, the objectives model then becomes inadequate because any attempt to formulate meaningful statements in terms of student outcomes is doomed to failure since those statements inevitably lack operationality and any in-built criteria against which their attainment can be assessed.

127. A frequent response to this kind of situation is to reject the measurement of personality qualities, attitudes, and so on, on pragmatic grounds because there is no obviously satisfactory method of organising such a measurement. The formulation of statements having the characteristics of goals and objectives becomes impossible and increasing emphasis is just put on the statement of aims. However, because these lack specificity and operationality, they have to be reinforced by prescription and recommendations for teacher activity and learning conditions. In this way, the objectives model is essentially abandoned and replaced by the process model, occasionally by a "mixed model" which has elements of the objectives model and the process model.

128. The abandonment of the objectives model in favour of the process model should not be equated with an abandonment of educational goals as such. Despite the emphasis on the specification teacher activities, there is an implicit acknowledgement even in this model that there must necessarily be student outcomes. However, these outcomes are left unspecified because it is acknowledged that there is a diversity of responses to result from the learning experiences created by the adoption of the specified instructional procedures, and/or because such outcomes are not measurable in any absolute way.

129. The rationale for not providing conditions for assessability is often that it is not desirable to measure student behaviour because of the overtones of conformity and uniformity or that it distorts the nature of knowledge to do so. Some critics would, therefore, argue that the use of the process model is unacceptable because it invariably fails to provide the certification which students may need.

130. The history of curriculum development over the past two decades in secondary and higher education holds warnings for the curriculum developer in further education today. It reflects the danger of adopting a polarised stance on the use of curriculum models and on subsequently imposing a particular model without due regard for measurement and assessment issues in certain curriculum areas. Above all, it demonstrates the importance of choosing an appropriate model to serve the curriculum rather than forcing a curriculum into a model which may be totally unsuitable.

Chapter 4 – The Organisation of Curriculum Content

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The Organisation of Curriculum Content

Introduction

131. In addition to the identification and articulation of curriculum intentions, the tasks of selecting and organising curriculum content are central to the curriculum development process. In the first of these tasks, the selection and, by implication, rejection of subject matter, the curriculum developer will be guided by his curriculum intentions as well as by the concepts and processes that characterise a particular subject. The choice of subject matter for inclusion in a curriculum is, thus, largely determined or at least influenced by considerations relating specifically to particular subject or subject areas. This renders a general analysis of features and factors concerning the selection of curriculum content virtually impossible.

132. The situation is different for the second task which concerns the organisation of curriculum content. Here, the essential question is in which format and arrangement curriculum content, once chosen, is to be presented to the learner. Of particular interest in this context is the "integration" of subject matter in a curriculum, which has been widely advocated by groups of developers. For this reason, we restrict our discussion of the theme "organisation of curriculum content" broadly to the issue of "integration", in an attempt to clarify this concept.

Theoretical Considerations

Towards a Definition: "Integration" and "Co-ordination"

133. The term "integration" has been used with a variety of different meanings. These reflect various assumptions about the function of knowledge, the organisation of learning, the needs of students and the nature of society. However, issues such as the nature of the institutional arrangements in the school or college and the extent to which the learner is free to develop his own approach to his learning are themselves consequences of the manner in which subject matter is used and have little direct meaning in the context of curriculum analysis. It is, therefore, with the manner in which *subject matter* is used that we are centrally concerned because it addresses itself directly to issues relating to curriculum development.

134. Traditionally, knowledge, as it is transmitted through institutionalised education, has been "compartmentalised" into separate knowledge categories which are recognised as "subjects" – such as history, physics, geography, and mathematics. These conventional subjects can, however, be brought together into broad "fields of knowledge". The rationales for bringing knowledge categories together in this way are essentially philosophical, and are based on analyses of, for example, the *functions* of knowledge fields, the processes whereby different types of knowledge are developed or the reference systems with which different knowledge areas are concerned. This has given rise to a number of classification systems such as those of Tykociner (1), Phenix (2), and Hirst (3). Phenix's system, for example, comprises six "realms of meanings", among them:-

i) 'Symbolics' – an area dealing with symbolic structures which include linguistics, mathematics, logic and information theory.

ii) 'Empirics' – an area dealing with the phenomena of nature and the universe, which includes physics, chemistry, geology, biology and the other natural sciences.

The other areas are ethics, aesthetics, synnoetics and synoptics. For their precise description, the reader is referred to the original.

135. It is evident from the preceding that it is possible, on theoretical grounds, to associate particular subjects with particular knowledge domains. On the basis of this we may formulate the following definition of "integration", insofar as it relates to the organisation of curriculum content:-

> Integration is the process of merging different subjects* or part-subjects through their co-ordinated use so that the individual components lose their original subject identity and a new curriculum study area emerges.

* A distinction is implied here between the term *discipline* which is used to refer to broad knowledge or study areas (eg. science, modern languages, etc.) and the term *subject* by which is meant an accepted knowledge category *within* disciplines (eg. an individual science within the broad 'science' framework, or Spanish within the 'modern language' framework).

136. This synthesising process may occur through:-

i) the integration of subjects *within* a particular field of knowledge or knowledge domain. An example of this would be the integration of two or more of the conventional science subjects into the broader area of (integrated) science. We may refer to this type of integration as *intra*disciplinary integration.

ii) the integration of subjects or part-subjects drawn from different fields of knowledge into a new curriculum study area. For example, technology as a study area would bring together components from the fields of science, economics, aesthetics, etc. We refer to this type of integration as *inter*disciplinary integration.

137. The essential feature of a genuine integration of subjects in a curriculum context is that subjects lose their identity as separate, recognisable study areas and instead, become submerged in the establishment of a broader field of study, thus, this process involves the *merger* of accepted subjects to produce a new study area.

138. An alternative way of producing in a curriculum context links between different established subjects is by bringing these together in such a way that each constituent subject retains its identity and, with it, its logical structure, and continues to be discernable as such even in the association of the different subjects. In the light of the definition of integration adopted here, this situation does not reflect genuine integration, and we propose that it be referred to as the *co-ordination* of subjects.

139. We may define *co-ordination*, insofar as it relates to the organisation of curriculum content, thus:-

> Co-ordination is the process of linking different subjects or part-subjects in a curriculum structure, so as to effect complementarity and interaction between them, but retaining the characteristics of each constituent subject or subject area in a (to the learner) discernable way.

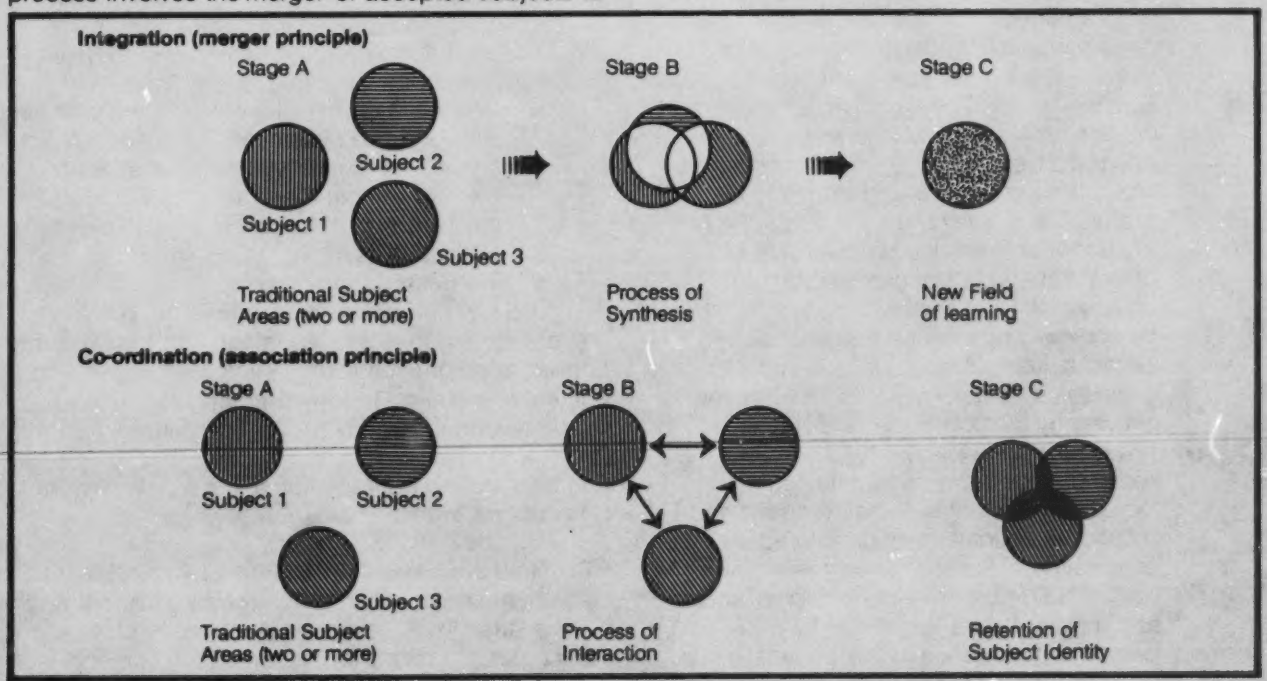

Fig. 2: Integration and Co-ordination

140. The essential differences between "integration" and "co-ordination" are represented diagramatically in Figure 2 on the previous page.

Arguments for and against Integration

141. Although the move towards the development of integrated curricula has found significant support from educationalists, arguments against integration are no less frequently brought forward. We present in the following some of the major reasons for and against integration:-

Arguments for Integration

i) Integration counteracts the compartmentalisation of knowledge which is the result of a 'subject-centred' view of knowledge held by 'experts'. To the learner, the imposition of subject boundaries is an artifical device and one of little direct meaning.

ii) Integration, especially of the *intra*disciplinary type, allows a more comprehensive view to be developed of a broad study area than is usually possible through the pursuit of individual subjects. For example, "integrated science" encompasses aspects of all the conventional separate sciences.

iii) Integration, especially of the *inter*disciplinary type, allows problems and issues to be explored in a holistic way, through bringing to bear upon them the perspectives of different subjects. For example, an understanding of social structures may best be achieved by synthesising themes or elements from diverse subjects such as economics, sociology, social psychology, geography (demography), and history.

iv) The explosion of knowledge and rapid social change have been reflected in increasing emphasis, in both general and vocational education, on a more active preparation of the learner for the modern world. The development of personal, social and "coping" skills is seen as being of particular importance in this context. It has been argued that such skills are best arrived at through an interdisciplinary study of themes and problems which relate to "real life" or vocational issues.

v) From a pragmatic point of view, curriculum packages based on integrated knowledge can (a) facilitate a higher degree of "balance" in the curriculum and (b) lead to a saving in teaching time. This kind of argument has been advanced for, for example the Schools Council Integrated Science project which, as a "double O level" GCE subject, allows a coverage of all sciences in the time normally required for the study of two single science subjects.

Arguments against Integration

i) In moving away from the division of knowledge in terms of the established subjects, one moves towards fields of studies which lack established enquiry modes and academic standards. This presents the problem of having to construct a framework of "academic rigour" within which to organise integration and of the acceptance of such "integrated curricula" outside the educational system.

ii) Integrated courses ignore the conventional divisions and distinctions between subject areas. This means that the learner is not likely to sample these areas adequately for the purposes of future career choice, estimation of his/her talents and inclinations, and so on.

It should be noted that some of the points presented here in relation to integration, may also be applied to co-ordination as a strategy of organising curriculum content. This is true for points such as (ii) and (v) under "Arguments for Integration".

Approaches to the Integration and Co-ordination of Curriculum Content

142. Both the integration and the co-ordination of curriculum content can be achieved in different ways; by and large, these reflect different bases on which the merger or association of curriculum subjects is achieved. We summarise here the most important of

these:-

Approaches to Integration

143. Integration as a method of merging curriculum subjects requires the identification and use of *integrating principles* on the basis of which the subject merger can be achieved. Such integrating principles tend to be derived from two main sources:-

i) the "internal" aspects of subjects, for example, their conceptual structure and their methodologies and processes;
ii) the nature of the problem or concern under consideration.

In relation to (i), integration can be achieved by organising curriculum content derived from different subjects in terms of the conceptual themes and/or the processes and enquiry modes common to them. In general, integration achieved in this way is of the *intradisciplinary* type.

Integration in relation to (ii) involves the organisation of curriculum content from different subjects on the basis of issues or themes which transcend conventional boundaries between subjects or disciplines. Such themes or concerns may have a practical orientation (eg. in linking design and engineering) or are non-practical in orientation (eg. the linking of politics and law).

The principal modes of integrating curriculum content are summarised in Figure 3.

Approaches to Co-ordination

144. A co-ordination between curriculum subjects can be achieved in at least three different ways:-

i) through the establishment of a link between subjects on a collaborative or supportive basis. This has been the case in, for example, the following projects: Nuffield Combined Science (linking physics, chemistry and biology); History Geography and Social Science 8-13 ("Time, Place and Society"); also, the Sixth-Form Mathematics project may be mentioned here since it explores links between mathematics and other subjects.
ii) through the choice of a common subject area, theme or topic which is considered

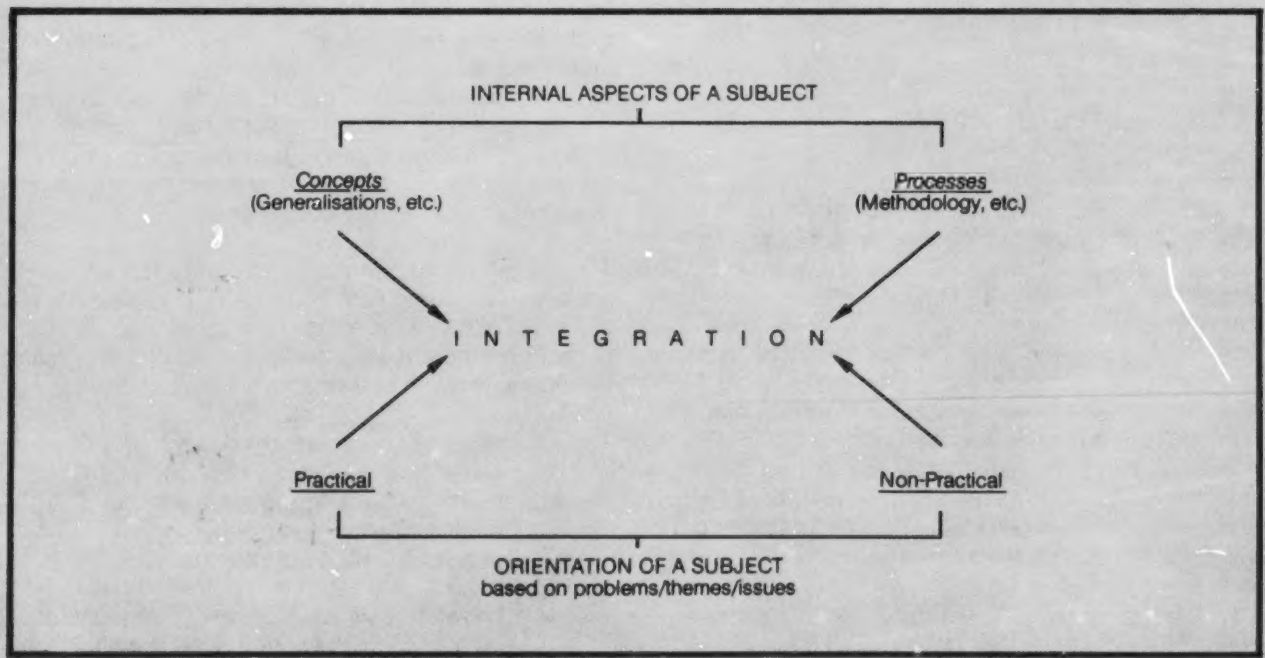

Fig. 3: Principal modes of integration

from the perspectives of different subject areas. For example, in the Open University's original Foundation Course in Social Science (D100), the theme of the population explosion was approached in a problem-solving way through the separate perspectives of sociology, pyschology, geography, economics and politics.

iii) through the sequencing and ordering of curriculum content, for example, by introducing a particular topic in one subject so as to reinforce the same aspect occurring simultaneously in another. An example of this is found in the current Open University's Foundation Course in Social Science (D101). Here, the theme "Work and the Individual" is first introduced in a psychology unit, then considered in turn from a sociological point of view, in terms of economics and, lastly, from a political perspective.

It is of interest to note that whilst in (i) and (ii) above the co-ordination of subjects is brought about through direct curriculum planning, in case (iii) it is the result of an appropriate sequencing of course units.

Analyses

145. Some fifteen of the forty-one curriculum projects considered during our preliminary analysis (see Appendix I) use curriculum content drawn from different subject areas, and so may represent either integrated or co-ordinated curricula.

146. An initial overview analysis of these fifteen projects gave information about the major subject areas which were brought together in the various curricula, the nature of the organisation of the content drawn from these subject areas and the reasons which led the curriculum developers to adopt integration or co-ordination. The findings from this original analysis are summarised in Table 1.

147. To a large extent, the information in the table is self-explanatory and does not require further comment. This is particularly true for the information presented under 2 and 3. On the whole, it appears that the projects have mostly attempted to bring about the integration of curriculum content drawn from different subject areas, rather than a co-ordination thereof.

148. As far as integrated curricula are concerned, the majority of these are of the *inter*disciplinary type, ones in which subject matter is brought together from different knowledge domains. In general, the orientation of these projects is towards the pursuit of "real" problems or the exploration of broad themes. A detailed discussion of this is given further below.

149. *Intra*disciplinary integration is relatively rare among the projects analysed and is confined almost entirely to the science area. This is largely due to the fact that in the science area individual subjects can be brought together on the basis of the conceptual structures and/or enquiry processes common to them. Such links are not readily forged between other subject areas. As will be seen from the separate discussion of projects in which intradisciplinary integration was effected, such projects also concern themselves with the exploration of selected themes or problems (eg. the theme of "energy"). In a superficial sense this may suggest a problem- or theme-based approach to integration; on closer analysis, however, it appears that the choice of themes or problems tends to be subordinated to the conceptual or process content common to the different subjects featuring in the integration.

150. Although there are many different reasons advanced by curriculum developers to explain their choice of either an integrated or co-ordinated mode of organising curriculum content, most of these can be reconciled with one or another of three broad justifications:-

a. to relate curriculum materials to pupils' or students' everyday experiences where problems usually appear in an interdisciplinary form, rather than a subject-bound context;
b. to counteract the compartmentalisation of knowledge which, from the young learner's point of view, may often appear artificial;
c. to promote "balance" within a curriculum

		Humanities Curriculum Project	General Studies Project	Project Environment	Health Education 5 - 13	Moral Education 13 - 16	Integrated Studies Project	History Geography & Social Science 8 - 13	Environmental Studies 5 - 13	Science 5 - 13	Nuffield Secondary Science	Schools Council Integrated Science Project	Nuffield Combined Science	Project Technology	Design and Craft Education Project	Religious Education 11 - 16
1. For whom was the project intended?	a) Age range (years) b) Ability range	14 - 16 medium/low	15 - 19 medium/high	8 - 18 all abilities	5 - 13 all abilities	13 - 16 medium/low	11 - 15 all abilities	8 - 13 all abilities	5 - 13 all abilities	5 -13 all abilities	13 - 16 medium/low	13 - 16 high	11 - 13 all abilities	11 - 18 all abilities	13 - 16 + medium/low	11 - 16 all abilities
2. What was brought together?	Main subject or study areas	Literature Drama Geography History Religious studies	Psychology Sociology History Geography Politics Religious studies Science	Geography Biology Sociology Ethics	Science (esp. Human Biol.) Psychology Sociology	Psychology Sociology Ethics Politics	Literature Drama: Art History Geography Science and technology Psychology Anthropology	Geography History Social studies	Science (esp. Biology and Geology) Geography History	Biology Physics Chemistry	Biology Chemistry Physics Geology Psychology	Biology Chemistry Physics Geology	Biology Chemistry Physics	Craft Science Maths History Geography	Art Craft Social studies Science	Theology Ethics History Sociology Psychology Philosophy
3. What is the nature of the linkage between subjects?	i) Integration ii) Co-ordination	✓	✓	✓	✓	✓	✓ (mainly but some integration achieved on limited basis	✓	✓	✓	✓	✓	✓ ✓	✓	✓	✓
4. What is the basis of the linkage?	i) Use of integrating conceptual structures ii) Use of common methodology and enquiry modes iii) Problem-orientation*	✓	✓	✓	✓	✓	✓ (in part) ✓ (in part)	✓	✓	✓	(✓) ✓	✓	✓	✓	✓	✓
5. Why was the integration or co-ordination attempted?	i) To relate materials to pupil's real life experiences** ii) To counteract the fragmentation of knowledge iii) To promote "balance" within curricula area	✓ ✓	✓ ✓	✓	✓	✓	✓ ✓	✓ ✓	✓	✓	✓	✓	✓ ✓	✓	✓	✓

* Problem-orientation here includes linkage on the basis of over-arching themes.
** Here the orientation is towards real life problems which could not adequately be dealt with in terms of a single subject.

Table 1. Integration or Co-ordination in 15 Schools Council and Nuffield projects

area by ensuring that all relevant subject matter components are represented in the curriculum content.

151. The table indicates where, in our view, the main emphases and justifications lie for the various projects analysed. No further discussion of these is presented but curriculum workers within FE may need to be mindful of the emphases in evidence here when elaborating justifications for their own attempts at integrating or co-ordinating curriculum content.

152. In addition to the overview analysis of the integrated and co-ordinated curricula, an in-depth analysis of five projects was undertaken. These were as follows:

Schools Council Integrated Science Project (SCISP);
Schools Council Humanities Curriculum Project;
Schools Council Design and Craft Education Project;
Schools Council Integrated Studies Project;
and the Open University Foundation Course in Social Science, "Making Sense of Society" (D101).

153. The first four of these are also among the projects included in the overview analysis, whilst the last one represents an example of curriculum work from higher education. The curricula were chosen because they feature different and contrasting aspects of integration and co-ordination. The Schools Council Integrated Science project is an example of an intradisciplinary integration, using mainly the conceptual structure of the sciences as the basis of integration, but it also attempts interdisciplinary integration in areas where its concern is with the applications and effects of science in a social context.

154. Both the Humanities Curriculum project and the Design and Craft Education project of the Schools Council are examples of projects featuring interdisciplinary integration. Their orientation is towards problem-solving, but this is of a practical type in the Design and Craft project whilst for the Humanities project non-practical issues form the focal point.

155. By contrast, the Schools Council Integrated Study project uses a mode of organisation of curriculum content which, in terms of our definitions, is best described as co-ordination. Lastly, the Open University course "Making Sense of Society" (D101) is of interest because it combines the features of both integration and co-ordination of curriculum content. Whilst, on the one hand, the course seeks to provide an integrated approach to the social sciences (through the use of broad common concepts and processes), it attempts on the other hand to make explicit the characteristics of the contributing disciplines (psychology, sociology, human geography, politics and economics).

Integration of Curriculum Content in Practice

156. We now discuss the modes of linking curriculum content from different subject areas in relation to the actual curricula examined by us.

Intradisciplinary Integration

157. Intradisciplinary integration, as previously defined, involves the integration of subjects on the basis of the conceptual structure and/or the enquiry methodology and thought processes common to them. The perhaps most significant examples of curriculum projects employing intradisciplinary integration are the Schools Council Integrated Science project (SCISP) and the Schools Council Science 5 - 13 project. Both, as their names indicate, relate to the science field, but they differ from each other in that SCISP is extensively integrated in terms of the conceptual schemes characteristic of the sciences, whilst Science 5 - 13 uses the processes of science as its main integrating principle. The choice of these two different integrating principles is in line with the type of learner at whom the two projects are aimed: SCISP is a GCE O level project designed for the above average pupils in the 14 - 16 age range (for whom the study of the conceptual content of science is entirely appropriate), whilst Science 5 - 13 aims at relatively young learners of all abilities for whom an "activity"– orientated curriculum

is preferred.

158. In general, the assertion can be made (and is borne out by actual curriculum examples) that intra-disciplinary integration based on the use of conceptual schemes tends to be associated with curricula aimed at "academic" students, for the reason that such students possess the abstract reasoning abilities usually demanded by concepts-based curricula.

159. When common methodologies and processes are used as the integrating principle, the resulting curriculum tends to be activity-orientated and focuses on the pursuit and application of these processes, rather than on the internal logic of the field of study. The territory for this application can usually be mapped out within the framework of a topic or a theme (in the case of a concepts-based curriculum this is not necessary), and knowledge items are drawn from contributing subjects only to the extent that they facilitate the pursuit of an activity. This approach to integration is attractive when developing curricula for "non-academic" students or for courses which provide an introduction to and overview of (for the learner) new fields of study (for instance, adult education students studying "social science" for the first time).

160. An essential characteristic of intradisciplinary integration is that it stresses and builds upon the similarities that exist between subjects in a given discipline or field of knowledge. Thus, it can provide a counterbalance to the normal "subject-centred" approach to education which is still widely adhered to in schools and colleges and which, by its very nature, tends to emphasise the distinctiveness of the different subjects. In addition to the self-evident educational advantages that may accrue from this, for example, providing a better curriculum balance, intradisciplinary integration can also achieve savings in teaching time. This has already been referred to in relation to the Integrated Science project of the Schools Council.

161. In our theoretical discussion of integration, attention was drawn to the use of broad problems and themes as integrating principles in the linking of subject matter. Although problem-oriented integration is most frequently found in the case of interdisciplinary integration, where subject matter is drawn from different areas of knowledge, it can also be used to achieve intradisciplinary integration. For example, a theme such as "energy" may be explored in its biological, chemical and physical contexts, without an overt distinction being made between these contexts. Providing only the scientific aspects of the energy theme are dealt with, the integration is entirely intradisciplinary. Any extension of the theme to its social context would move it into the realm of interdisciplinary integration.

162. The harmonised use of both concepts and processes as integrating principles provides the curriculum worker with a particularly useful basis for the development of intradisciplinary integrated curricula. In such curricula, concepts can readily be introduced within broad themes which serve as the vehicles for the building up of sequences of skills relating to the characteristic processes of the contributing subjects. In SCISP, for example, there are three main themes – "Building Blocks", "Energy" and "Interaction and Change" – and within these themes the student is familiarised with concepts, such as size and measurement (in relation to phenomena which range from planets to electrons and from population to cells), and cause and effect (related concepts which are implicit in the idea of interaction resulting in change). Additionally, the themes serve as organising entities for a number of activities which are common to all branches of science and which, in the case of this project, serve to unify the processes inherent in the subject matter of chemistry, physics, biology and geology. These include observing, classifying, measuring, and predicting. In exposing the student to both concepts and processes common to four scientific subjects, the intention is to enable him/her to identify those generalisations and explanations which distinguish science from other disciplinary areas and to use such "patterns" as a base from which to explore problems/issues relating to the social application of scientific knowledge.

Interdisciplinary Integration

163. The essential feature of interdisciplinary integration is that it seeks to merge subject matter drawn from different areas of knowledge. Our overview analysis of the fifteen projects using some form of subject matter linkage, either in the form of integration or co-ordination, indicates that projects involving interdisciplinary integration are often oriented towards "real life" problems or where the emphasis is on the personalised response of a student to a situation, often quite complex, to which no correct or incorrect answers as such exist. For example, the Open University course "Making Sense of Society" uses integration "to enable mature students to link their own life experience" to the concepts of the social sciences. The Schools Council Design and Craft Education project, through the emphasis on design, stresses problem-solving as well as aesthetic judgements, the latter clearly involving a person's unique response to a given problem or situation.

164. As has already been pointed out in the theoretical section, attempts to bring about interdisciplinary integration of curriculum content generally focus on problems or themes as the key to integration. When the stress is on problems and problem-solving (the term is used here in the broadest possible sense), this applies frequently to areas or issues of social relevance or concern and generally involves the adoption or development of moral and humanitarian values. The Schools Council Humanities Curriculum project illustrates this particularly well with units on War and Society, Poverty, Law and Order and Relations between the Sexes.

165. The question must be raised whether interdisciplinary integration must inevitably be based on the pursuit of problems or themes as an integrating principle, or whether such integration cannot also be organised on the basis of concepts or processes as they may be characteristic of the subjects merged in the integration. Our analysis suggests that attempts to bring about interdisciplinary integration through the internal aspects of subject matter, that is, concepts and processes, have been largely unsuccessful. Concepts frequently lose their meaning once they are separated from their normal disciplinary context. Take, for example, the concept of "power". This is understood in very different ways by an engineer or scientist on the one hand, and a sociologist on the other. Thus, attempts at integration using general concepts like "power" an as integrating theme are not very meaningful.

166. Similar reservations can be advanced in the case of interdisciplinary integration using processes as an integrating principle. The Schools Council Integrated Studies project, for instance, tried to abstract certain processes inherent in different types of subject matter in order to use them as tools for enquiry. Experience has shown, however, that such attempts present problems of definition and of interpretation. Building models in mathematics is, for example, widely recognised as being a different process from model-building in sociology and the two should not be confused, despite the use of common terminology.

167. In view of the formidable difficulties associated with attempts to merge epistemologically different areas of study along conceptual or process-based lines, it must be argued and recommended that this approach to interdisciplinary integration be avoided altogether. The only potentially promising approach to the merger of subjects or part-subjects from different areas of knowledge would appear to lie in the use of problems or themes as providing the common ground between the subjects. Not infrequently, such problem-orientation can result in new "fields of knowledge" which readily gain academic recognition and acceptance as independent fields of study. Examples of this are, in terms of curriculum areas, environmental studies, moral education, and health education.

168. Despite the broad success of problems and themes as integrating principles in interdisciplinary curriculum integration, a note of caution is justified in relation to the use of themes. As has been remarked, for example, in the Schools Council Integrated Studies project's guide for teachers, themes *per se* cannot act as an integrating principle because they

give only a vague indication of the orientation of the integrated study and serve merely as an "umbrella" term under which integration is organised. Thus, "energy", "domestic life" or "consumer education" as examples of themes can achieve coherence only if they are further analysed in terms of the issues and problems they may be attempting to raise or, possibly, the concepts and processes which are to be taught through them. This point is of particular relevance in relation to the humanities and the social sciences where themes are taken from broad concepts which are often imprecise, open to interpretation and sometimes difficult to apply.

169. One reason why interdisciplinary integration is attractive as a method of organising curriculum content, when the overall orientation of the curriculum is towards "real life" problem-solving, is that it provides a wider range of analytical tools than are available in the pursuit of single subjects. By "analytical tools" we mean here the various enquiry modes and perspectives as may be characteristic of the particular subjects that are merged in the interdisciplinary integration. This is strongly in contrast to intradisciplinary integration which, when based on processes and enquiry modes, relies on their similarity or even identity for the merged subjects.

170. Interdisciplinary and intradisciplinary integration are not mutually exclusive and can stand side by side, as is the case in the Schools Council Integrated Science project. Although the main concern of that project is to establish and explore the "unity" of scientific knowledge, it also considers issues and problems as they relate to, or emerge from, the application of science in a social context. It is recognised that complex social concerns cannot be adequately analysed from a simple intradisciplinary basis and, hence, for this part of the curriculum an interdisciplinary problem-orientated stance is adopted.

171. In general, it can be claimed that problems or themes, when treated in an interdisciplinary way, tend to trigger off enquiry which is characteristically wider in scope and more open-ended than themes in an intradisciplinary enquiry. This is due to the fact that the integrating principles operated in intradisciplinary integration tend to impose limits to the scope of an enquiry. It is, therefore, important that the curriculum developer clarifies the function of a theme or problem in an integrated curriculum and ensures that this function is compatible with the nature of the integration.

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Chapter 5 – Instructional Procedures

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Instructional Procedures

Introduction

172. The overriding aim of the curriculum developer is to bring about an organised improvement in the quality of teaching and learning. This improvement hinges on three main factors:-

a) a re-assessment of the aims, objectives and goals of an educational intervention – this is often expressed in relation to student outcomes but sometimes (indirectly) subsumed in the specification of the pedagogical procedures to be adopted by the teacher (see paras 84-113);
b) an appraisal or re-appraisal of the content of instruction (in terms of the knowledge, skill and process items to be introduced to the learner). This involves content selection as well as rejection but can also (and often does) involve a re-assessment of the structure of a subject and its relationships with other subjects. In this latter case, subject integration or co-ordination may result (see Chapter 4);
c) decisions about the style or strategy of teaching which, in turn, entail assumptions about how students learn and about what style of learning is most conducive to the attainment of the intentions of a curriculum.

173. Improvement in the quality of teaching and learning is, therefore, normally attempted along three dimensions of change – relating to intentions, to content and to styles and strategies of instruction. This particular section of the analysis is concerned primarily with the last of these factors – styles and strategies of instruction – though it is recognised that, in terms of an overall approach to curriculum planning, this factor is inseparable from the others listed above, especially the first one.

174. The focus of the analysis here will be threefold. It will

a) identify the different teaching strategies which are recommended within different curriculum projects and examine the assumptions about learning and teaching which underlie them;
b) comment on problems and issues arising from implementing different teaching approaches and strategies;
c) examine, where appropriate, the validity of the assumptions about learning and teaching which underlie different instructional approaches.

Definitions and Background Comments

175. Instructional procedures refer to those activities recommended by the curriculum developer which are seen as effecting or influencing an improvement in the teaching/learning situations. The activities may be those undertaken by the teacher to provide and structure learning experiences for the students or equally they may be those undertaken by the students themselves with or without teacher intervention. Thus, "instructional procedures" is a term which seeks to describe a spectrum of activity ranging from situations in which the teacher assumes maximum control over the learning experience to situations involving, for example, self-direction and self-instruction, where immediate responsibility is largely assumed by the student himself. The term is, therefore, seen as being more comprehensive and more flexible than other (competing) terms, such as "teaching/learning methods", and "teaching strategies", and should not be confused with the label from US practice in the educational technology sense which has a different usage.

A Classification of Major Dimensions

176. The spectrum of teacher/student activity subsumed under the term "instructional procedures" naturally presupposes a diversity of associated styles and strategies of teaching and learning. This diversity is very much in evidence when one examines the proposals/recommendations in curriculum projects regarding the nature of the learning experiences associated with these curricula. Almost all projects either implicitly or explicitly attempt to promote particular styles or strategies by recommending the adoption of certain instructional procedures, the underlying assumption being that through this an improvement in the quality of teaching and learning will result.

177. These recommendations, as made by curriculum developers, may be said to relate to four major factors:-

A. the extent to which the instructional process involves expository (didactic) or discovery-based (heuristic) strategies;
B. the extent to which learning is "experiential", that is, based upon or involving students' direct or indirect experiences, or the degree to which it is "non-experiential" or theoretical;
C. the extent to which learning outcomes are teacher-controlled or student-controlled and, therefore, the extent to which learning can be said to be "open-ended";
D. the extent to which learning is teacher-based or involves techniques or strategies which do not require direct teacher involvement. The latter techniques are essentially self-instructional procedures.

178. These four areas are, to some extent, interdependent but will be separated so as to facilitate further description and analysis. For convenience, they will be referred to as

A. The Expository – Discovery Dimension;
B. The Experiential – Non-Experiential Dimension;
C. Teacher-Control versus Student-Control of Learning Outcomes;
D. Teacher-Based Learning versus Self-Instruction.

The Expository-Discovery Dimension

179. The expository-discovery dimension relates to the way in which the learner acquires the knowledge or skills (in the widest sense) which the curriculum specifies. Two extreme positions may be identified:-

i) the knowledge or skills items (these may include value positions, social behaviour patterns, etc.) are *stated* by the teacher, together with suitable examples and illustrations. This approach may be termed *expository teaching* or *reception learning*;
ii) the knowledge or skills are derived by the learner from examples or learning experiences which imply the knowledge/skills items without stating them overtly. Essentially, this process requires the learner to acquire the knowledge by an act of discovery and may be termed *discovery learning.*

180. These positions may be thought of as lying at the two terminal points of a spectrum of instructional modes in which the ratio of exposition to discovery can vary considerably:-

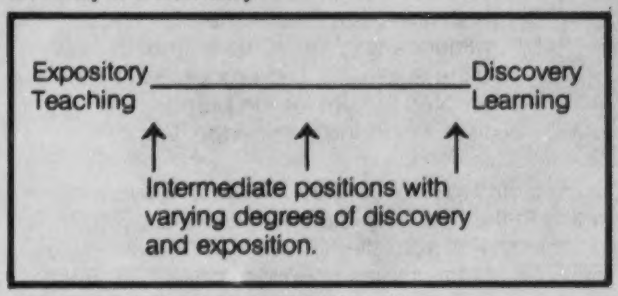

Fig. 4: The Spectrum of Instructional Modes

181. Expository strategies of teaching are, of course, used extensively in higher and/or further education; the wide use of lecturing techniques demonstrates this. Although these strategies are often criticised, they still occupy a significant place within the repertoire of teaching methods. When used purposefully and backed by suitable tutorial work, the lecture continues to be a powerful information disseminating device.

182. The instructional procedures prescribed or recommended by most curriculum development projects aimed at the secondary education level lean heavily towards the discovery end of the spectrum of teaching modes, without showing a total commitment to the discovery mode of learning. At the primary education level, however, such commitment is much more prevalent but this will not be explored in the context of this analysis.

183. Teaching approaches which are characterised by a high ratio of discovery learning to expository teaching may broadly be termed "guided discovery". However, as the Fig. 4 implies, this term is open to a

variety of different interpretations, depending on the balance between discovery and exposition that is involved.

184. A further ambiguity connected with the term "guided discovery" stems from the fact that it does not reveal the nature of the guidance which is provided to the learner. Here again two "extreme" possibilities arise:-

a. guidance is provided about the type and nature of the conceptual content that is to be learned; that is, about the knowledge to be acquired by the learner;
b. guidance is given to the learner in relation to the strategies and processes to be adopted by him for the purpose of discovering the knowledge items.

185. Both types of guidance can have a legitimate place in the practical implementation of guided discovery. For example, if students are required, as part of a social studies course, to collect information on the eating habits of a cross-section of people in their local community, the teacher could supply them with guidelines about how to conduct interviews, prepare questionnaires and evaluate responses. In this case, the guidance provided is concerned with the strategies and processes of discovery learning (type b. above). Alternatively, the teacher might have given guidance about the nature of the information to be sought and the variables to be explored; he might even have informed students about the findings from other studies. In this case, the guidance concerns the knowledge that is to be obtained by the learner (type a.), not the process whereby it is obtained.

186. In practice, it is likely that both forms of guidance are used simultaneously, to varying degrees. Whatever guidance is provided for the learner, it is important to recognise that the act of providing such guidance represents an intervention on the teacher's part in the discovery learning process. It is our view that the curriculum planner should be clear about the nature of such interventions and their effect upon the nature of the conditions under which learning is to occur.

187. It follows logically from this discussion that intervention in relation to the knowledge to be discovered (type a. intervention) reduces the learner's opportunity for abstracting knowledge from learning in his or her own way; in turn, a type b. intervention reduces the learner's scope for developing and using his/her own enquiry methods. Such restrictions as may be imposed upon the discovery process by teacher interventions are generally acceptable and, indeed, often desirable in order to "guide" students towards particular learning outcomes.

188. It should be pointed out at this juncture that discovery learning should not be construed as being necessarily "open-ended". The expository-discovery dimension discussed here concerns the mode in which knowledge and skills, and so on, are acquired by the learner, not the nature of such knowledge. Even though the curriculum developer, in opting for a discovery-based approach, requires students to acquire knowledge and skill items through a process of personal discovery, this does not preclude such knowledge and skills being pre-specified by him, in the form of objectives and goals.

189. Open-endedness, by comparison, would exist when the learning outcomes from discovery situations can only be very broadly anticipated, because, for example, the exposure to learning experiences may invite a diversity of personal responses from the students.

190. Whilst there are no examples among curriculum projects of the two extreme positions outlined earlier (see para 179), many of the projects analysed tend broadly to give priority to discovery-based strategies. Thus, early science projects sponsored by the Nuffield Foundation are committed to structured heurism, reflecting a view of knowledge which de-emphasises its contribution as a body of facts and re-asserts its potential to develop and strengthen the powers of the individual to think and act effectively. For example, the main proposals on which the original Nuffield O level Chemistry (1) scheme was based and which have remained unchanged in the revised O level scheme, include the following statements:

"Pupils should gain an understanding that lasts

throughout their lives of what it means to approach a problem scientifically. They should be taught to be aware of what scientists are doing and can do. This has little connection with the short-lived remembering of dictated information. Therefore, science should be presented to pupils as a way in which they can conduct an enquiry into the nature of things as well as a body of information built up by the enquiries of other people. Pupils must approach their studies through experiments designed to awaken the spirit of investigation. They must be given opportunities to observe and explore so that they develop disciplined, imaginative thinking and are made fully conscious of the important part science plays in modern life.....

.....We want pupils to learn to distinguish between observed phenomena and explanations put forward by the creative thinking of the human mind. Pupils must learn to see the interplay between observed fact and explanation, and to appreciate how science develops through this interplay."

191. The Schools Council Humanities Curriculum project is also located near the "discovery" polarity of the continuum; although here the label "discovery" needs qualification. In this project, there is no exposition by the teacher and "discovery" does not take place within the structure of pre-determined rules. The prescribed instructional procedure – evidence-based discussion under the neutral, impartial chairmanship of the teacher – involves discovery in the sense that students derive, from exposure to the curriculum materials, "rules" for their own purposes in relation to their private and social lives. Unlike the "rules" to be acquired through the discovery-based strategies of the Nuffield Science projects (which are essentially about items of content and skill), the "rules" in the Humanities Curriculum project concern self-development, self-realisation and relationships with others. The "rules" are, therefore, of a different nature to those in the Nuffield Science and clearly involve open-endedness in that they can be interpreted in an infinite variety of ways.* The prescribed instructional procedure of this project is described and explained in considerable detail in the introduction for teachers and re-inforced by a set of principles of procedure which structure the teacher's activity in a highly specific way. The teacher's intervention is, however, wholly concerned with the *strategy* of learning and intentionally avoids, by imposing the neutral chairman role on the teacher, any attempt at defining the content of the student's learning.

192. Another curriculum which, in some respects, has a similar ethos to the Humanities Curriculum project, is the Open University course "Art and Environment". In this, the student is presented with ideas, values, points of view and multi-media stimulus materials which are intended to provoke deep reflection and a new understanding of self and relationships on the part of the student. One of the purposes of the course is to enable the student to shed the "constraints" of previous socialisation so as to "self-realise" and "self-develop" along new, hitherto uncharted routes. In this way, the curriculum seeks to release the student from one set of value-based "rules" in order to impose another different set, one which intentionally undermines the student's habitual ways of thinking and acting. As in the case of the Humanities Curriculum project, a totally individual response within this value-position is being sought from the student and, thus, a diversity of largely unanticipated outcomes is intended.

193. There is, however, no teacher intervention of any kind in this course because it is designed for distance-learning and by-passes the teacher. There is, on the other hand, substantial structuring by the *curriculum developer* in respect to the strategy of learning in that the student is given extensive instructions on the use of the multi-media materials and on the setting up of the different types of learning experiences. The curriculum developer does not, however, attempt to define the content of the student's learning other than to provide, through

* The learning outcome, although pre-specifiable within a given value framework, must necessarily be highly individual and personal to each student because of the nature of the knowledge to be acquired. This is so for all curricula which predominantly concern the adopting of a value position, set of attitudes, social behaviour patterns, and so on, and consequently are a feature of all curricula which seek to develop social and life skills.

extracts of prose and a range of other stimuli, a particular mood, climate or backcloth against which the student creates his own experiences.

194. History 13-16 shows a similar bias towards the discovery end of the continuum. This project designed for all ability groups, rejects a concept-based approach to history in favour of one which focuses on historical processes. Discovery-based strategies are used to extract "evidence" from (mainly) secondary sources resulting in a more active, less theoretical treatment:-

> "Since the (student) outcomes hoped for are attitudes and abilities rather than memorisation of facts, classroom methods should be favoured which create an active learning situation for the student rather than those which cast the teacher in the role of a transmitter of information."

The underlying rationale of the recommended strategies is that adolescents can be helped through the study of change over time towards an understanding of the present. The project is, therefore, as much concerned with students' needs as with historical processes, a fact reflected in the guidelines to the teacher:-

> "The suggestion ..... is that it might be more meaningful to see history as a heap of materials which survives from the past and which historians can use as evidence about the past ..... History in this sense involves a perpetual act or resurrection in which (students) and teachers reconstruct the past and so make it become real and "present' to them ..... It implies the active enquiry of (students) into the various kinds of primary and secondary sources which make up the raw materials of history." (2)

195. A number of curriculum projects tend to cluster around the mid-point of the expository-discovery continuum and involve some aspects of both strategies in their recommended instructional procedures. Geography 14-18, for instance, recommends instructional procedures which promote student-based, enquiry-oriented procedures. It advises teachers to adopt strategies which involve students in the processes that professional geographers use to solve problems and which individualise learning so as to take account of divergent interests and different learning styles. The project gives particular attention to the following instructional procedures:-

a) the use of classroom questioning by the teacher;
b) group work involving problem-solving activities by the students;
c) individual study by the students.

196. Each of these procedures involves different degrees and types of teacher intervention. Classroom questioning by the teacher implies relatively high structuring of the content of learning though some bias towards discovery. Group work involving problem-solving, by comparison, implies a much lower structuring of the content of learning and varying degrees, according to the age, ability and past experience of the students, of intervention concerned with the strategy of learning. Finally, individual study implies very little, if any, intervention by the teacher concerning either the content or the strategy of learning.

197. There are, however, aspects of exposition in the recommended instructional procedures. The teacher is involved in a certain amount of theoretical explanation about the nature and use of geographical concepts, models and strategies of enquiry for the problem-solving activities and is required, by the curriculum development team, to explain and clarify the use of specialist geographical language. Such procedures are intended to structure in a very specific manner the content of learning. Thus, the instructional procedures in this project cover a range of different types and degrees of teacher intervention, and require the teacher to be constantly moving between the different roles of disseminator of information, facilitator and guide.

198. Of the projects and courses analysed, the curriculum showing the least emphasis on discovery-based strategies and the most emphasis towards exposition is the Open University's Foundation course in the Social Sciences, "Understanding Society" (D101). For the most part, theoretical ideas, concepts, models, and so on, are presented to the

student in the correspondence texts and followed up by illustrations from the same texts, or from the set reading or the television and radio broadcasts. However, since this is a distance-learning course, such ideas, concepts, and models are presented to the student through the use of technological media rather than by a teacher. The correspondence units, in addition to providing theoretical content, also incorporate substantial information relating to the strategy of learning. For those students who attend optional, back-up tutorials at local study centres, there is further help available with study skills and with the theoretical content of the course. There is, therefore, a high degree of curriculum developer and/or teacher intervention which has implications for both the strategy and the content of learning.

The Experiential – Non-Experiential Dimension

199. The second dimension along which instructional procedures can be analysed concerns the extent to which they provide the learner with direct or indirect experiences of what is to be learned or discussed, or the extent to which such learning is based on "theoretical" grounds. Broadly, this dimension may be referred to as the experiential versus non-experiential dimension.

200. In accordance with the above, judgement about whether a particular teaching strategy is experiential or non-experiential involves an appraisal of the extent to which the learner is exposed to direct or indirect experiences as part of the learning process. In this context, the notion of "experience" (and hence "experiential") requires some explanation and amplification.

201. The provision of "experience" in the context of instruction is seen by us as involving the deliberate exposure of the learner to phenomena or situations about which or through which learning is to take place. Such exposure may be achieved in different forms:-

i) *direct* experiences which allow direct familiarity to be gained of the phenomena or situation;
ii) *indirect* experiences which allow familiarity of the phenomena or situation to be gained either
   a) *vicariously*, through "second-hand" involvement provided e.g. by films, plays, demonstrations;
   b) through *analogues* to the phenomena/situation to be experienced; such "analogues" would compromise, *inter alia*, simulation activities, role-playing, gaming exercises.

202. The essential feature of "experience" in the present sense of the term is to enable the learner to develop insights, skills and attitudes in relation to concrete (or concretised) situations. The absence of such experiences from an instructional situation will inevitably tax the learners' abstract thinking ability more highly. In the context of subject areas, it is clear that some subjects lend themselves more readily to experientialism than do others and that the nature of the experientialism will vary. Table 2 (page 50) is designed to illustrate this latter point, though no distinction is made here between the different forms of experience referred to above.

203. The Open University course "Art and Environment" (TAD 292) is one whose entire content develops through the students participating in, and reacting to, the experiences set up by the curriculum developers. These experiences are designed to reflect the expression of certain ideas, values, beliefs, attitudes and opinions held by the curriculum developers about the relationship between art and man, art and society, art and environment, and so on. Following exposure to those experiences, it is intended that the student adopts for himself/herself these ideas and values, and thereby, gains new insights which will aid his/her personal development and realisation.

204. The course uses all the various types of experiences referred to in Table 2 overleaf and is unusual because of its total reliance on experientialism in its various forms as a means of achieving the intentions of the curriculum developer. Of particular interest is Unit 8 on "The Moving Image" which concerns the moving-image environment created in our culture by film, radio and television. One such activity called "middlecasting" involves

BROAD CURRICULUM AREA	TYPE OF EXPERIENCE THAT CAN BE PROVIDED
Science	Practical work in laboratory Field Work – geological, environmental, biological. Visits to industry, museums, etc. Simulation, gaming, including computer-aided work
Mathematics	Conduct of experiments for data collection Use of geometrical models, etc. Computer simulations; computer graphics work
Languages	Conversational learning in groups and language laboratory Visits to foreign countries Simulation activities
Social Studies	Gaming and role-playing Simulations Use of documentary films, etc.
Design/Craft	Practical work in workshops Exposure to works of art, designs and materials, e g. through exhibitions, films, etc.

Table 2. Some Examples of 'Experiential' Situations

experiencing phenomena/events through the medium of television "to see what is missing". This activity is prefaced by some comments on the power of television as a medium, its effect in terms of perpetuating certain life-styles and attitudes and the concentration of power to use censorship, persuasion and deception in the hands of a relatively small number of people. The activity then involves:-

i) watching a cross-section of television over a period of a week and asking oneself questions such as "what parts of the recording environment do I not see?", "what information is left out by the "framing" of the camera and microphone?", "what sorts of human interaction are rarely seen in certain sorts of recording environments?", "what people and events are never shown on television?";
ii) jotting down the answers to these questions;
iii) using the notes as a guide to formulating an idea or piece of missing information which the student would like to see on some form of television;
iv) making a score or script using the medium of choice;
v) finally, considering the question "how can I transmit this idea via television?"

205. No other curriculum analysed can be so located at the experiential polarity of the continuum although a number of curricula shows substantial use of experientialism. The Humanities Curriculum project, for instance, relies on two principal instructional strategies: the use of discussion under the chairmanship of a "neutral, impartial" teacher (see paras 216-218); and the use of evidence. This "evidence" consists of photographs, films, tapes, slides and extracts from books and other printed sources grouped around eight themes which raise controversial issues. It is through interaction with these materials that the student becomes involved vicariously with the dilemmas posed by war, famine, inadequate housing, unequal educational opportunity and so on. The Integrated Studies project also uses indirect experiences extensively. Unit 1, for instance, "Exploration Man", uses photographs, slides, extracts of prose and poetry, tape recordings and posters (ie. vicarious experiences) as well as role-playing and simulation

(analogues) to explore man's relationships with himself, other people and his environment.

206. The Design and Craft Education project is one which makes extensive use of direct experiences. In one of its themes, "Materials and Domestic Life", students work with a range of materials from plastics to new decorating materials and undertake conversion, renovation and decoration of the home, layout of gardens and minor building projects. In another area, "Materials and Community Development", students are encouraged to identify community needs, translate them into design terms, formulate proposals and implement them under staff guidance. Work undertaken in the trial school where the ideas were tried out involved working with geriatric patients, preparing play equipment in educational priority areas and restoring parts of old historic buildings. In "Materials and Work", production line situations in the school workshops were developed for short-term adoption and attempts were made to develop schemes involving work experience.

207. Many of the science projects too involve direct experiences through the use of practical work. Thus, the Schools Council Integrated Science project (SCISP) uses a great deal of practical work as a means to introducing students to those important "generalisations" or "explanations" which give unity to the separate contributing subjects of geology, biology, physics and chemistry in Science. Non-examination "Science for Life" projects such as the Schools Council Working with Science and Nuffield Secondary Science projects use practical work based on the use of themes as a means of de-emphasising the theoretical, subject-based approach and focussing on the everyday applied aspect of science.

208. The curriculum which, among the projects analysed, rates lowest in experientialism in terms of the proportion of time spent by the student in non-experiential as opposed to experiential situation, is the Open University's "Understanding Society". Certainly the majority of television programmes which form an integral part of the course involve the student in indirect experientialism of the vicarious type and expose him/her to filmed real life situations in which the various theoretical ideas of the correspondence units are in evidence. The majority of the students' time is spent, however, with these correspondence units which are, in some cases, highly abstract and devoid of experientialism.

209. It was also noted that, in general, mathematics curricula rate low in experientialism because the content is necessarily high in abstraction. Only those curricula which emphasised the application of mathematics to the problems of daily life and involved substantial practical work (such as the Mathematics for the Majority project and the Sixth Form Mathematics Curriculum project) showed a bias towards direct experiences.

Teacher-Control v Student-Control of Learning Outcomes

210. This is an area of decision-making which relates to the extent to which learning can be said to be open-ended. The notion of open-endedness, which is well established in educational thinking, essentially implies that the learning outcome to result from a particular educational situation or experience is *not* pre-specified and that it is, therefore, not controlled in an *a priori* way by the curriculum developer or the teacher. Examples of genuine open-endedness in learning/teaching are frequently found in activity-based education at the primary/junior school level. When it occurs, the aims/goals and objectives of a lesson or an activity are essentially flexible and usually subject to the interests and inclinations of the learner. In practice, of course, the teacher would adjust the aims of his/her lesson in accordance with the students' interests and the direction of their particular activities.

211. In a situation like the one just described, we might argue that the direction of the learning and hence of the learning outcomes are extensively determined or, at least, influenced by the learner. We may refer to this as being indicative of *student control*. In contrast, situations where the direction of a learning and hence, of learning outcomes are not or only to a very limited extent, subject to student influence, are basically *teacher-controlled*.

212. The terms "student-control" and "teacher-control" have been chosen entirely for convenience. It is inevitable that in a rather vaguely defined area like that of instructional theory no fully uniform and generally agreed terminology should as yet have emerged. In consequence, alternative sets of terms exist which express broadly similar distinctions as those described by "student-control" and "teacher-control". Such alternatives terms are:-

i) student-direction versus teacher-direction;
ii) "open" curriculum versus "closed" curriculum (although this latter set of terms, in the present context, would not apply to the total curriculum but only to one subject).

213. Student-control and teacher-control of learning outcomes can manifest themselves in several major ways. Aspects promoting student-control are:-

i) pursuit of genuine open-ended teaching activities, (eg. those frequently advocated for primary/junior school work);
ii) project-based learning and discussion-based learning for which pre-determined objectives or goals cannot be specified;
iii) adoption of teaching strategies in which a high degree of responsiveness prevails to student questions and initiatives.

214. Teacher-control, on the other hand, tends to be associated with:-

i) reliance on pre-determined lesson objectives, especially those relating to cognitive and psychomotor aspects;
ii) pursuit of teacher-generated questions and lines of enquiry;
iii) high information-dissemination function of teacher.

215. The above points can, at least in theory, relate as much to the adoption of particular teaching styles as to the recommendations concerning the conduct of instruction made in particular curriculum projects. It is not the intention of this analysis to distinguish between these two. Rather the purpose of what follows is to:-

i) examine different selected curriculum projects/courses in relation to the extent to which the instructional conditions recommended, promote student-control or teacher-control of learning outcomes;
ii) identify and describe the major forms of manifestation of student-control or teacher-control.

216. Of all the curricula analysed, the Humanities Curriculum project addresses itself most to the issue of the locus of control over learning outcomes. Because the choice of controversial issues as the content of this curriculum is rooted in the concerns of modern society, it was felt by the curriculum developers that democratic principles of society should inform the prescribed instructional procedures. This meant adopting strategies which:-

i) sought to guarantee that the teacher was doing all he could to protect students from their own bias while attempting to advance their own understanding;
ii) inculcated the fundamental values of rationality, imagination, sensitivity and readiness to listen to the views of others;
iii) enabled students to understand divergence of views;
iv) preserved privacy and protected students from ridicule and social pressure to conform to majority view points;
v) helped students to understand the nature and implications of their own views and grow to adult responsibility by adopting and assuming accountability for them;
vi) renounced the authority of the teacher as an expert capable of solving value issues (3).

217. The above considerations all reflect a concern with the control over learning outcomes and with the question of where and with whom this control should be. It was felt that in situations where there cannot be agreement over the content of learning (and where in any case, it is not desirable that conformity of view should prevail) that the teacher could ensure divergency only by adopting the role of neutral chairman. This concept of neutrality does not, however, imply a value-free stance but rather one which favours democracy by encouraging open debate and a freedom from teacher bias on those issues "for which society has not found a solution

which can be universally, or almost universally accepted". Teacher neutrality in this sense means non-directiveness and is one of the strategies open to teachers who wish to pass maximum control over learning outcomes to the students themselves.

218. The Humanities Curriculum project offers the most outstanding examples of non-directive teaching strategies where the curriculum developers have acknowledged total commitment to the notion of student control over learning outcomes. It contrasts sharply with the Moral Education 13-16 project, one which appeared at much the same time and has some overlap in terms of content but takes quite a different line on the locus of control over learning outcomes. The Moral Education project also seeks to explore the dilemmas posed by the moral aspects of everyday life but argues that adolescents need guidance in such matters, that they frequently request such guidance and that it is part of the teacher's responsibility to supply it. It, therefore, recommends that teachers assume a direct line which, in consequence, results in a less open-ended curriculum in comparison with the Humanities Curriculum project.

219. Another curriculum which is relatively open-ended (though not to the same extent as the Humanities Curriculum project) is the Design and Craft Education project. The definition given to design and craft education by the curriculum developers, "a subject that is concerned with the identification and solution of problems in the use of materials that occur in the social systems in which our students will be adults", includes the specification of a problem-solving approach which in turn implies the adoption of certain types of strategies. The problem-solving approach used in the design process involves a number of linked processes beginning with a detailed preliminary identification of a problem, diagnosis of the needs to be met by a solution and the eventual finding of a solution which appears to satisfy the necessary criteria as fully as possible within the limits and opportunities available. The process involves skills, both cognitive and practical, and different ways of thinking (convergent and divergent) which, when used in combination, solve problems. For this reason, the work has to be student-centred, project-based and must necessarily involve degrees of student-control, particularly in relation to the creative and practical aspects of designing.

220. The idea of student control over learning outcomes is given prominence in the guidelines to teachers. It is recommended that the content of the learning experiences be negotiated between student and teacher and that the student be allowed increasingly to both identify and solve his/her own problems in areas which interest him/her most, although this varies according to the age, ability and experience of students. One of the handbooks for teachers, "Materials and Design: a fresh approach", discusses strategies for aiding creativity and thus, making the content of learning more open-ended. Two different techniques are suggested, viz. brainstorming and mindstretching. "Brainstorming" is a strategy adopted from the ideas of the Humanities Curriculum project. It takes place in a discussion in which the teacher may act as a "neutral chairman". He records all suggestions made on a blackboard or by a tape recorder but refrains from selecting or modifying the students' ideas. Speed is essential because the idea is to stimulate the imagination. No pauses should, therefore, be allowed for evaluation or criticism of a suggestion. "Mind-stretching" comes in various forms, one of which is to redesign something about which students have formed fixed preconceptions, such as being asked to redesign a bicycle frame in wood or acrylic plastic.

221. There are, on the other hand, aspects of the Design and Craft Education project which show a leaning towards teacher-control of learning outcomes. Some lessons will have student outcomes concerning, for example, the carrying out of a task which relies on pyschomotor skills (building part of a garage, for instance). Such practical work necessarily follows a highly detailed specification and cannot, therefore, be open-ended. Other aspects of the project feature the dissemination of information by the teacher. In "Materials and Domestic Life", one of the thematic areas, students can be given information about the organisation of the social services, option mortgage and rent rebate schemes, finance, marketing, mass communication or the

changes resulting from the development of the European Economic Community.

222. The Design and Craft Education project, therefore, demonstrates a blend of student control and teacher control of learning outcomes. Where creativity is being sought on the part of the student, the teacher adopts strategies which effectively pass control to him/her so that he/she assumes responsibility for creating or making meaningful the learning experience. This results in open-endedness of learning outcomes. Where practical/pyschomotor outcomes are being sought, however, which are pre-specifiable, the control over learning outcomes remains largely with the teacher.

223. Another curriculum whose total emphasis is on creativity on the part of the students and open-endedness of student outcomes is "Art and Environment". Since this is an OU distance-learning course which does not feature teacher intervention, the teacher-control/student-control dichotomy is not an issue. Distance-learning more usually features a high degree of control by the curriculum developer over learning outcomes but in the case of this course, the curriculum developers make substantial efforts to pass maximum control over learning outcomes to the students and safeguard open-endedness. This is achieved through the following strategies:-

i) creating, through the use of multi-media stimulus materials, a certain climate/set of conditions for learning designed to encourage the expression of certain emotions, values, opinions, sensations, attitudes, and so on, which all concern the self, one's relationships with others and with one's environment;

ii) giving students the necessary means (equipment, verbal instructions,) to set up their own learning experiences and encouraging them to express in wide range of written, visual, oral and aural forms, their reactions to these experiences;

iii) refraining from giving students any guidance about the nature, quality or form their reactions should take and re-inforcing this by frequent references to the merit of individualised and idiosyncratic responses and the strategy of negotiated assessment with the tutor.

224. There is less emphasis on creativity in Geography 14-18 but greater emphasis on cognitive skills involved with the concepts and processes of geography. The recommended instructional procedures – use of classroom questioning, group work involving problem-solving activities by the students and individual study – vary in the degree and locus of control over learning outcomes. The use of classroom questioning is the strategy showing the most teacher-control, though this control can be varied according to the way in which the questions are framed. The teachers' handbook draws attention to the fact that much classroom interaction is teacher-dominated and much classroom questioning involves only the recall of information (which is obviously associated with teacher-control). The curriculum developers suggest using a taxonomy for the framing of questions which are then based on different intellectual processes such as comprehending, analysing and evaluating, and on different forms of knowledge such as knowledge of facts, concepts and models. A sample matrix is offered which features thirteen different questions each of which is distinctive because it involves different intellectual processes and forms of knowledge. Although all these questions demonstrate the exercise of teacher-control, this varies in degree. Those questions relating to knowledge of facts, for example, demonstrate more teacher control than those questions which tax the high cognitive abilities of the students, such as analysing and evaluating. Here the outcomes (ie. the answers to the questions and the inter-actions which follow between teacher and student(s) are more open to student influence.

225. Group work involving problem-solving activities is less teacher-controlled than classroom questioning. The teacher's handbook suggests directing students' attention to "mismatch problems"; that is, some incongruence between their everyday, taken-for-granted perceptions of the world and some reconceptualisation of those perceptions through an acquaintance with new concepts and models (a strategy very similar to "mind-stretching" in the Design

and Craft Education project). The students, however, are allowed to recognise and solve such problems (or "mismatches") in their own way through co-operative group effort. At this point, some of the teacher control over learning outcomes passes to the students.

226. Lastly the individual study or extended essay is the instructional procedure which demonstrates the most student-control. It involves the student formulating an argument relating to a clearly defined question/hypothesis/problem and showing evidence of an understanding of the use of sources, their limitations, the interpretation of data, the application of principles, the clarification of values and the communication of the results of the enquiry.

Teacher-Based Learning v Self-Instruction

227. Traditional forms of teaching and instruction are essentially teacher-directed with respect to a range of instructional variables such as:-

i) the rate of presentation of information;
ii) the format and sequence of presentation of information;
iii) the amount of practice provided, for example, through problem-solving situations or actual language training;
iv) the feedback provided for the learner as regards his progress.

In conventional teaching, it is the teacher who *controls* the above variables in a *direct* way and thus, creates a learning environment in which learning is essentially "teacher-based" or "teacher-controlled".*

228. In recent years, new instructional strategies and procedures have emerged which, at least to some extent, shift the control of instructional variables like the above, from the teacher to the learner. This development is a direct result of the work of educational technologists and is often associated with terms such as:-

individualised learning;
personalised learning;
independent learning;
resource-based learning;

and most recently

open learning.

Although the strategies denoted by these terms are not fully identical in that somewhat different characteristics may be associated with several of them (see below for a detailed discussion), their common attribute is that they reduce substantially, and even eliminate altogether in some instances, the direct control of the above instructional variables by the teacher and, instead, transfer this control to the learner.

229. To exemplify this point consider a situation where identical subject matter is taught (a) by a teacher in a normal classroom or lecture theatre setting; (b) by means of a self-instructional "learning-package" (eg. a programmed text). Whereas in (a) the rate of presentation of information is entirely determined by the teacher or lecturer, in (b) the student controls the rate at which the information is assimilated in accordance with his normal reading and thinking habits. The instruction under (b) thus becomes self-paced. It may, of course, also differ in the teacher-based form of instruction with respect to other instructional variables, and would probably do so in an actual case.

230. It is important to stress that when referring to teacher-control of instructional variables, our emphasis is on their *direct*, that is, immediate control. This must be distinguished from their *indirect control* which is the control exercised by a teacher (or curriculum worker) through the planning and design of self-instructional materials. For example, a self-instructional sequence may be so designed that it allows a learner to proceed *via* smaller or larger learning steps, as shown in Fig. 5 overleaf.

231. Clearly, the decision about whether the learning tasks should be developed in the form of alternative routes and about the actual nature of such routes, are in the hands of the developer (ie. the teacher). He controls which learning routes are at the learner's disposal but does not automatically control the route actually chosen by a particular student. In this sense,

* The term "teacher control" in this context refers to the control of instructional procedures and strategies, *not* to the control of learning outcomes as discussed in paras 210-226.

the direct control of the student's learning is shifted from the teacher to the learner. Admittedly, if the learner task had provided only one single route, the question of control in relation to "format and sequence of presentation" (variable ii in para 227) would not have arisen.

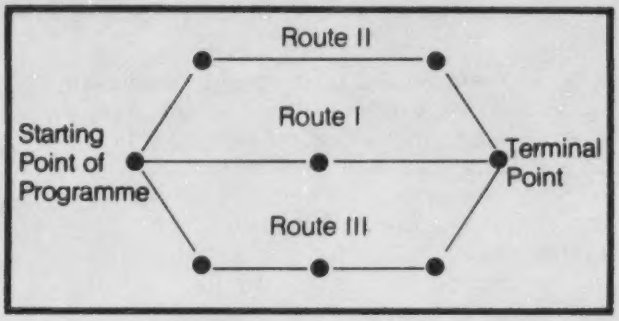

Fig. 5: Schematic Representation of a Learning Task Offering a 1-Step, 2-Step and 3-Step Learning Route as Alternatives.

Major Characteristics and Range of Self-Instructional Procedures

232. It is not our intention to attempt an evaluation of the merits of self-instructional procedures as compared with those of conventional modes of teaching. Indeed, such an evaluation would be impossible without prior agreement having been reached about the criteria on the basis of which merits and demerits might be determined.

233. One general characteristic of practically all self-instructional procedures is that they are *competence-* and *performance-oriented.* That is to say their quality tends to be judged in terms of their effectiveness and efficiency in leading a learner to the acquisition of predetermined objectives, usually of a cognitive type. The teaching and development of affective and inter-personal skills is generally agreed to be outside the scope of self-instructional procedures, although physical skill training is well within the scope of these procedures.

234. The competence/performance-orientation of self-instructional procedures leads to a number of instructional conditions which should be fulfilled in the design of self-instructional materials:-

i) the outcomes of learning should be specified in terms of the competencies to be attained and the conditions under which they are to be exercised;

ii) a detailed diagnosis should be made of the initial state of a learner entering a particular instructional situation. This could involve, for example, the determination of a student's "pre-knowledge" in the area to be studied and, ideally, an assessment of his learning characteristics, such as learning style and preference for different modes of teaching;

iii) the learning materials should provide alternative educational routes that are adaptive to the classification resulting from the diagnosis under (ii). If this requirement is fulfilled, the educational route through a learning sequence can be matched to the characteristics of a learner;

iv) the student's performance throughout the learning process should be monitored for two main reasons:-

a) it provides the learner with direct feedback about his performance and enables him to choose educational pathways appropriate to his state of knowledge; alternatively, if the choice of such pathways is "predetermined" by the instructional designs (as would be the case in computer-aided instruction), the performance monitoring directs the student automatically to a learning route which is judged to be most appropriate to his needs;

b) results collected from the monitoring of students' performances may be used to improve the efficiency of the instructional system itself; that is, it forms a basis for its further development.

235. The preceding list is based on Glaser's analysis (4) and although some cases have been reported where individualised instruction systems have been developed on that basis, by and large its realisation is still difficult to accomplish. Nevertheless, the list offers a sound and appealing "yard-stick" whereby

the characteristics of different self-instructional techniques can be assessed. It is employed in the description of various self-instructional systems given in the next section.

236. A second general characteristic of self-instructional procedures is their dependence on the use of media. By "media" we mean all the various techniques or channels through which information can be transmitted (excluding teachers though). Such media are, for example, texts and other written materials, slides, photographs, audio-tapes, video-tapes, electronic devices, microcomputers and computers.

237. An important distinction to be made here is between the use of media for the purpose of illustrating lectures or providing "vicarious" experiences and what we refer to as "mediation". In these situations, the media do not form an "independent" means of communication, but are essentially aids, at the teacher's disposal, to develop his/her teaching to beyond the possibilities offered by the teacher's verbal communication. Media use in this context has been covered by our discussion in paras 210-226. In contrast, mediation refers to attempts to use different media as a means of presenting self-instructional materials to the learner.* In the simplest case, the programmed text is one such medium, whereas the most sophisticated medium serving the same basic purpose is the computer.

238. In the case of self-instructional procedures, mediation offers two potential advantages:-

i. it allows alternative communication modes to be employed for the transmission of information to the learner;
ii. it may facilitate improved individualisation of instruction, (ie. allow a better matching of educational strategies to the needs and preferences of the learner).

For example in relation to i), the use of a programmed learning sequence prescribed in a tape-slide format employs verbal (aural) and visual communication forms, as compared with the printed information in programmed texts. Likewise, the learner's mode of responding actively to test situations incorporated into programmed learning sequences varies according to the medium used for the sequences. Teaching machines, now no longer fashionable, invariably required the learner to indicate a choice of responses by pressing some switch or button instead of actively writing out an answer. Improved individualisation, referred to under ii), can be obtained, for example, by the use of computer-based instructional systems which allow the pre-programming of many alternative learning routes which can be matched to the learning behaviour of different learners.

239. The following notes are designed to summarise the main characteristics of the various techniques of individualising instruction which are currently used to a significant extent. No attempt is made to produce a comprehensive analysis here.

Programmed Learning

240. The general characteristic of programmed learning is that the material to be learned is broken into small units which are sequenced in a linear or a "branched" arrangement. Each small unit requires the student to make an "active response" to a test question or similar. The answer to the question is normally provided at the beginning of the next learning unit or "frame".

241. Programmed learning was the first major "educational technology" procedure to find relatively wide-spread acceptance, and much interest in it was shown during the 1950's and 60's. Since then interest in the development of programmed learning has declined.

242. The key feature, in educational terms, of programmed learning techniques is that they are *self-paced,* the rate of information up-take being controlled by the student. In linear programming, the form of information presentation and its sequence are fixed as is the rate of practice and feedback provided for the learner. Branched programming is

* Additional information about the use and selection of media may be obtained from the Council for Educational Technology or texts such as Rowntree, D. Educational Technology in Curriculum Development, Harper & Row, 1974. Rowntree, D. Developing Courses for Students. McGraw Hill, 1981 and Romizowsky, A. Selection and Use of Instructional Media. Kogan Page, second edition 1977.

more flexible, at least in relation to the mode of information presentation, but is generally more difficult to design and implement. Computer-assisted learning systems potentially provide a means for the wide-spread development of a really flexible system of branched programming (see below).

Individualised Learning Systems

243. Programmed learning techniques of the traditional type have the major limitations of not facilitating a genuinely individualised teaching approach. The reason for this is that apart from allowing self-pacing and, in the case of branched programming, some limited choice of learning routes, they do not provide adequate flexibility in matching educational activities to students' preferred study habits.

244. One type of system which, it is claimed, provides this flexibility is known as "Keller Plan", named after the American psychologist Fred Keller who first proposed it (5). The essence of "Keller Plan" is that it replaces lectures and formal teaching by written materials, subdivided into short sections known as "units". Units are written by course planners often to supplement information from text-books, although, occasionally, they may form the complete medium of instruction. Students work through each unit at their own pace and when they are confident that they have mastered the material, they take a test. The test is marked immediately by a tutor in the student's presence. The function of the tutor is to point our errors made by the student and to help identify any weaknesses the student may still have. If the latter are significant, further (remedial) study material is specified by the student at the completion of which a further test is taken. No penalty is imposed for any errors made by the students or for having to study supplementary material. Only if an adequate mastery of the material of a given unit has been achieved by the student, is he allowed to proceed to the next study unit.

245. The Keller Plan system succeeds, at least in theory, in implementing most of the criteria listed in the preceding section. It allows a greater degree of flexibility in "tailoring" instruction to the characteristics of the student and, in so far as it also involves teachers/tutors as an "integral" part of the educational strategy, allows feedback to be collected about the student's learning and the effectiveness of the system. Additionally, it promotes the personal interaction between teacher and student which other approaches, such as programmed learning and computer-based instruction, sacrifice.

Resource Based Learning Systems

246. In the implementation of both programmed learning techniques and individualised learning systems, as discussed in paras 240-245, the usual "classroom" setting characteristic of normal teaching is abandoned and replaced by the strict "personalisation" of instruction.

247. Resource-based learning, as we wish to characterise it, forms an approach to instruction which combines elements of conventional classroom or group teaching with a significant amount of individualised instruction. As Taylor (6) describes it:-

> "Resource-based (learning) systems .... are systems where children learn chiefly from materials of one sort or another, directly or indirectly – the teacher having an intermittent role, though none the less vital."

248. A schematic plan for resource-based learning given in a document by the Association for Science Education (ASE) (7) exemplifies the interaction between conventional class teaching and independent learning. The plan advocates four basic phases as part of a learning unit:-

i. *Introductory phase:* this is concerned with the introduction of a new topic and also with familiarising a class or group of students with the resources relating to the topic. It involves *class-teaching.*

ii. *Individual study phase (Independent Learning):* during this, the learner works individually or in collaboration with one or two other students on particular tasks and/or problems identified during the introductory phase. The nature and rate of work can usually be adjusted by the teacher so as to be in line with the students' interests, ability and working habits. Teacher intervention can occur for the purpose of helping and guiding students in their activities.

iii. *Recapitulation/consolidation phase*: this takes place towards the end of the learning unit or course and is designed to summarise findings and possibly, to make a transition to the subsequent learning unit.

iv. *Assessment phase:* throughout the learning unit or course, the student's progress is monitored at regular intervals. On the basis of the information derived the student's further learning activities can be decided upon.

249. The practical implementation of resource-based learning systems firstly entails a major change in the role of the teacher from that of an information disseminator to that of a "manager of learning", and secondly, requires "learning resources" to be developed and collected on a significant scale. Both aspects can be demanding and challenging. Nevertheless, resource-based learning systems have been reported to function with a high degree of effectiveness and some examples of recently developed systems are discussed in the analysis part of this section.

Open Learning Systems (Distance Learning Systems)

250. The term "distance learning" was originally introduced to describe the mode of working of the Open University. Recently, with the development of "open learning" systems, the term "distance learning" has acquired a specialised meaning which is given in para 253. In this discussion, we shall use both terms in their now current meanings, as appropriate.

251. Open learning is used to denote modes of study in which the student does not work under the continuous and direct supervision, and guidance of tutors, but where he enjoys the regular support of a tutorial organisation. The function of this tutorial organisation is to guide the student's study programme and to check and provide feedback on his progress.

252. Of some interest in the arrangement of open learning systems is the actual (geographical) relationship between the learner's base and the location of the tutorial support organisation and hence, the nature of the guidance/tutorial support.

253. In the context of its Open Learning Systems project, the Council for Educational Technology (CET) has identified three types of open Learning system:-

a. *distance learning systems* in which the students are remote from the college. Thus, the courses resemble correspondence courses but may be supported by periods of residential study or elements of study counselling as appropriate;

b. *college-based systems* in which the students are based at the college or institution but study on their own and at their own pace;

c. *local systems* where the students study part of the time at home and the college provides study counselling, tutorials, library access, etc.

254. The question merits examination whether and to what extent open learning meets the criteria of individualised learning previously outlined. Insofar as it is left to the students undertaking open learning to decide upon the timing and the modes by which they study, an open learning system produces a certain degree of flexibility. This flexibility concerns, of course, only the implementation and execution of open learning. As far as the programmes themselves are concerned, it must be recognised that for open learning systems:-

i) course aims and objectives are generally predetermined;

ii) course content and teaching materials are usually fixed;

iii) only limited flexibility can normally be provided as regards alternative teaching and resource material and, hence, learning routes.

The foregoing points, together with the extensive reliance on the student exercising personal responsibility for the work to be done, gives open learning broadly the characteristics of self-instructional systems.

Self-Instructional Systems in Practice

255. It is important to point out that within the framework of our curriculum analysis, it is not

possible to identify a single project which is entirely self-instructional. However, a number of developments have taken place including those relating to curricula in which some degree of self-instruction and individualisation of learning procedures is relied upon. The area in which most of this development has taken place is in the area of higher education and, therefore, much of the analyses will focus on developments within that field.

Programmed Learning

256. This section has three sub-divisions based on the form of mediation used to present the programmed material. It features programmed texts (used on their own or linked to another media such as audio cassette), tape slide presentations and computer-aided instruction sytems. It does not feature the use of teaching machines because, as previously indicated, this medium has now become obsolete.

a. Programmed Texts

257. It is clear that programmed texts no longer enjoy popularity of the type seen in the 50's and 60's. They continue to feature in the fields of medicine, languages and science but in greatly reduced numbers or in a rather different form from that assumed by their traditional predecessors. One of the reasons for their decline in popularity is the inconclusive nature of the evidence relating to student attainment, for it is far from clear whether its supporters' claim of superior attainment by students exposed to these procedures is indeed justified.

258. In the teaching of languages, courses such as Programmed Instruction Language Learning (PILL) (8), which were developed at the height of the popularity of language laboratories, continue to be commercially produced in a number of modern languages. The presentation of the material and the grammatical constructions and phrases offered to students are identical across the languages and certain claims are made by its designers about student competencies after the completion of the 24 hours of student work which these texts in conjunction with audio-cassettes represent. However, experience in the use of the texts has shown that they are not sufficient in themselves in establishing the basic structure of a language. Whilst they offer practice in certain selected aspects of grammar and everyday phrases and lay some claim to giving students early confidence in pronunciation, they nevertheless require co-ordination with additional instructional procedures such as teacher exposition and group conversation in order to achieve coherence and realism.

259. Worthy of mention in the context of science teaching, however, are the four programmed texts written for use with the Nuffield Advanced Chemistry course. In the introduction of one of these texts, "Ethanol and other alcohols" (9) it is stated that "the main aim throughout the writing, development and evaluation of these programmes" is their "successful integration into school courses and relevance to actual classroom situations". It is also stated that the programmes are to be used during the first year of the two-year course and as a revision text. The programmes, therefore, do not constitute a total course but are an integral aspect of an 'A' level curriculum and perform a specific role within it.

260. "Ethanol and other alcohols" differs from the programmed texts in languages referred to earlier in two main ways. First, its greater emphasis on explanation and consolidation lends greater coherence to the programme and make it less reliant on the teacher as a necessary support system than one finds with the PILL courses. It should, therefore, make the realisation of independent learning more attainable. Secondly, it is designed with more than one purpose in mind in relation to both practical and non-practical work – as a teaching instrument, as a revision tool and as a source of additional ideas and activities for the motivated student. It can be used more flexibly than the more traditional programmed text approach.

b. Tape-Slide Presentations

261. There is no doubt that tape-slide as a medium for the presentation of programmed material has increased in popularity recently. It enjoys many of the

advantages of the illustrated lecture (with the notable exception of providing an opportunity for addressing questions to the lecturer) and can claim the added benefits of easy storage and retrieval, self-pacing and multiple viewing/listening.

262. Consequently, tape-slide presentations have been used in place of lectures to disseminate information of a factual or theoretical nature in all subject areas. They are also widely used in relation to the teaching of procedures which follow a prescribed or approved-of sequence such as those which feature staff induction programmes, health and safety programmes, and library use programmes. Lastly they are being used increasingly in place of teacher demonstration and/or practical work by students in areas such as domestic science, beauty therapy and science where the high cost of certain materials make it impractical for instructional procedures to be used. Tape-slide sequences are also useful as a replacement for practical work in conditions where classes are large, or there are safety hazards involved in the experiment. In general it appears that after the initial heavy investment of lecturers' time in developing tape-slide programmes, a considerable and continuing saving ensues. Additionally students are afforded a high degree of flexibility in terms of when and how often they use the programmes.

c. Computer-Aided Instruction Systems

263. There has been in the last few years a sharp increase in interest in the possibilities offered by computers in programmed interactive learning. This is testified by the many reports and discussions papers being written, particularly in the higher education field and of course by the work of the National Development Programme for Computer Assisted Learning. NDPCAL has sponsored some 35 studies and projects, 9 of which were concerned with science, engineering or mathematics at higher education level* and took the major share of the funding. Not all of the nine projects involve Computer Aided Instruction (CAI) or tutorial dialogue in which the student is taught individually in small steps and provided with immediate feedback on his responses; some, such as "Computers in the Undergraduate Science Curriculum" are concerned with computer simulation in which a student talks to a tutor or to another student about what a computer is doing rather than "conversing" with the computer. However, the Computer Assisted Learning in Chemistry Project (CALCHEM) has devised programs which enable the computer to conduct tutorial dialogues with students to help them:-

a. prepare for laboratory exercises;
b. learn to interpret spectra**;
c. analyse experimental results;
d. solve organic analysis problems.

264. Another project, "Basic Mathematics at Undergraduate Level" was developed at Glasgow University and used with first-year students of a wide range of mathematical ability and from a number of faculties. Its computer-based tutorial dialogues are intended to help students gain confidence in their knowledge of mathematical topics and in problem-solving. The computer in this case is used as a support systems to give students individualised practice of the mathematical concepts introduced in the lectures. This work in mathematics has recently spread into physics teaching within that university and now both mathematics and physics teaching units are available.

265. At its present state of development, computer-assisted instruction has a number of disadvantages. Compared with its predecessor, the programmed text (or even a lecturer), it is expensive, although with the introduction of the micro-computer the relative cost is swiftly coming down. In common too with the programmed text, it obviously works towards predetermined objectives and can only cater for the

* The nine projects are: "Computers in the Undergraduate Science Curriculum"; "Computer Assisted Learning in Chemistry"; "Computational Physics Teaching Laboratory"; "The MATLAB Project"; "Cambridge University Transferability Project"; "Basic Mathematics at Undergraduate Level"; "Engineering Science Project"; "Computer Assisted Technological Education of Service Personnel" and "Computer Assisted Learning in Nuclear Science and Technology". Information about these projects and an analysis of computer-assisted learning in Science, Mathematics and Engineering at teriary level is contained in Tawney, D.A. (ed) "Learning through Computers" Macmillan Press Ltd. (1979)

** though here, additionally, simulations are used to inform the student who has guessed the structure of a compound incorrectly by what a spectrum would have looked like if his guess has been correct.

stereo-typical student responses, despite its interactive facility and appeal to "individualisation". However, the reception given by teachers to the materials produced by the NDPCAL project testifies that a need certainly existed and that the materials have gone some considerable way in meeting this need. Undoubtedly, the tutorial dialogue programs can claim to motivate students more than the programmed text and provide support to a teacher by performing step-by-step tasks which a teacher would find tedious. It would, therefore, be wrong to suppose that CAI is a teacher substitute; rather it complements and extends traditional teacher-based instructional procedures.

Individualised Learning Systems

266. Despite the advantage offered by a programmed text such as "Ethanol and other alcohols" mentioned earlier, or those computer assisted instruction programmes offering interactive tutorial dialogues, these two systems can only offer the individual student a limited amount of diagnosis of learning needs and can only respond in terms of a restricted number of alternative learning paths. The interest, therefore, which has been shown in the Keller plan system (or PSI – the Personalised System of Instruction – as it is sometimes called) is a reflection of the perceived inadequacies of programmed learning procedures. Though its application has almost entirely been limited to the sciences and engineering, within this range it has enjoyed a broad spectrum of coverage and been used in astronomy, biology, biochemistry, chemistry, digital systems of engineering, electrical engineering, library science, mathematics, mechanical engineering, nuclear engineering, operations research, physics, psychology and statistics.

267. Comparatively few courses have, however, operated according to the original Keller model; the greater number has used a modified model. However, of those using the unmodified version, all, without exception, have reported successful usage. One such report (10) describes a longitudinal study of three groups of students on physics courses taught either by the Keller plan system or by the lecture-discussion method. Students from these groups were compared in two subsequent chemistry courses and a biology course. In each course, the Keller-taught group achieved significantly higher grades. The major area grades of students who had graduated in applied mechanics and engineering sciences, biology, chemistry and physics were also compared, and in each case the Keller-taught group again achieved significantly higher grades. A much earlier experiment using the Keller plan system based at the University of Surrey describes its use in three courses: introductory mathematics for switch-to-science students; second-year quantum mechanics; and first-year classical mechanics. The report (11) concludes that, in relation to student performance "there was evidence for improved learning, a reduction in the failure tail and increased confidence in work. Costs were reasonable and would be expected to drop with greater experience and repeated use of materials".

268. A modified version of the Keller plan system used in an area other than the sciences is currently being used in the Department of Business Studies at Manchester Polytechnic to teach marketing to both sub-degree and degree students. The system is based on a tutorial-tape-document package consisting of audio-cassettes, a document file, skeleton notes, exercises and tutorials and details about the nature and preparation of the material are supplied for each of the items. Its developer reports mainly favourable reaction from students and feels that it has potential as an individualised learning system (12).

269. A better known variant of the Keller plan system is, however, the Physics Interface Project (PIP), a collaborative venture set up in 1970 between six universities, Birmingham, Cardiff, Chelsea (London), Keele, Surrey and York, with financial support from the Nuffield Foundation. This has developed a series of diagnostic tests to identify gaps in the knowledge of physics students entering university. These tests are used at an early opportunity with the students: their performance is discussed with them with the minimum of delay by the tutors and students are given supplementary work to remedy those weaknesses identified by the test. This takes the form of self-teaching units, "liberally sprinkled with review

questions and requiring somewhere between one and three hours to work through", post-tests to indicate levels of mastery and tutorial contact. It is reported (13) that "the outstanding advantages of the system, highlighted by the project's actual experiences are that:-

a. students' problems can be individually, speedily and reliably identified without the need for time-consuming interviews;
b. students are encouraged to help themselves to remedy any weaknesses or deficiencies in their grasp of the subject matter under consideration;
c. the extra "remedial" activities can be undertaken without prejudice to, and possibly to the enhancement of, ongoing course work;
d. students respond favourably to what they see as a personal concern on the part of the university teachers and as an encouragement to obtain greater benefit (and, therefore, better progress) from their courses;
e. the battery of self-teaching units in modular form, which can be used singly or in a variety of combinations, allows the units to be introduced into almost any context where the subject matter is relevant. They have been used quite successfully in lieu of introductory lectures as well as for their originally intended purpose of providing individual and independent help;
f. the approach itself, quite apart from the materials, is relevant for courses and students everywhere. What has been found to work for physics students can, in principle, be made to work for almost any subject where prior knowledge is assumed at each stage of the educational process."

270. Some difficulties reported in the use of the Keller plan system are as follows:-

a. there is some evidence of procrastination. One report states that "very few students completed all the units ..... and the majority did not get further than halfway. It is believed that the lack of set routine and any compulsion to work ..... makes it likely that the less determined students will put off doing the work, so that it does not get done at all" (14);
b. the cost in terms of tutor time in running the programme is substantial;
c. some argue that the subtleties of a subject can only be conveyed by a lecture presentation.

However, the difficulties encountered with the system are outweighed, according to the literature, by the successes and mention is frequently made of the effectiveness over other modes and the high morale of the students who enjoy the challenge of self-pacing and the motivation of good grades at frequent intervals.

Resource-Based Learning Systems

271. Resource-based learning is now being practised on a large scale in all sectors of education. The resources being used are very varied and are being fitted into learning systems ranging from the use of simple centralised collections of resources to highly organised multi-media centres supplemented by elaborate facilities for the preparation of new materials. As it is not possible, within the scope of this analysis, to provide a comprehensive coverage of the total range of development which has taken place in resource-based learning systems, some selection of illustrative material must be made. So far in this section on self-instruction, our analyses have been confined to developments in higher education; thus, it seems sensible to redress the balance and concentrate on the not insignificant advances which have occurred over the last ten years in secondary education in relation to resource-based learning systems and to single out a number of such developments for special attention.

272. The popularity of resource-based systems is a reflection of the attempt to lead students to common educational goals while at the same time catering for their individual abilities, aptitudes, learning styles and interests. The subsequent growth of interest in the production of resources has led to changes at local, regional and national levels taking place to improve information, offer advice, provide for the exchange of

materials and support the training in educational technology. In the late 1960's, the Nuffield Resources for Learning project (15), for instance was set up to experiment in the production of packages for individual and group learning which could be mass produced via two regionally-based projects, – the curriculum Resources Development project (Leicestershire) and Calouste Gulbenkian Regional Resources Centre project, based in the Institute of Education of the University of Exeter, some years later. The Leicestershire project's brief was, "to provide material for curriculum change" based on a Teachers' Centre, while the Exeter project concerned itself with the more technical aspects of support such as costing, staffing, information, equipment, resources, communication and training.* More recently, a very comprehensive report has been published on the rationale and development of resource-based learning in Clwyd Secondary Schools (16) arising out of the Clwyd Resource-Based Learning project. This report includes a jusitification of curriculum development and resource-based learning, the obstacles to resource-based learning, an examination of the problems of effecting change, the management of innovation and the notions of the problem-solving school.

273. Many curriculum development projects for secondary level have made provision for independent learning based on the use of resources. The Schools Council General Studies project (1968-74), for instance, was primarily concerned with guided individual study based on the use of resources, supplemented by tutorials and different kinds of group discussion, and encouraged adopting teachers to try out and assess new methods and develop old ones. For this purpose the project, helped by associate teachers, built up a resources bank of some 6000 loose-leaf items which included newspaper cuttings, book extracts, photographs and references to film. In its published form the Project consists of study units containing selections of these resource materials and study guides to enable the student to work independently. These units each of which provides at least one hours' work for the 16-18 year old of average/good ability, cover a wide range of sub-topics within the following areas: Psychology, Religion, Crime, Genetics and Evolution, Nazi Germany, Townscape, Modern Britain, Growing Up, Science and Society, World Affairs, Population and Environment, and Interplay. At the end of each unit there are questions which can be used for assessment purposes.

274. The Schools Council Integrated Studies project has also been developed in units, each of which contains packs of resource-based student material to be used with individuals or groups. The resources include newspaper cuttings, extracts from literature, slides, worksheets, tapes, photographs, posters and statistical tables. The independent learning activities are seen by the project's developers as one important means of helping students to integrate their learning experiences in their own minds and to grow towards self-reliance by identifying and solving a range of personally significant problems. The introductory phase to each unit involves instructional procedures which use teams of teachers; the recapitulation/consolidation phase is less formally articulated but suggestions are made in the Teachers Handbook for the regular assessment of students' work by means of written and oral questioning, attainment tests and teacher observation check-lists. It would seem, therefore, that by and large each learning unit can be treated as a resource-based learning system.

275. There are several examples of science projects/developments which involve resource-based learning systems Independent Learning in Science, a national organisation which was set up, in 1973, at Countesthorpe College, Leicestershire, "to provide co-ordination of thought and enterprise in establishing methods of independent learning in science and to provide for co-operative development in the preparation and dissemination of ideas and resources". An article about the teaching of chemistry at Countesthorpe (17) outlines the advantages of independent learning, the role of the teacher and the use of written resources which centres on worksheets but also uses work-booklets, heat-sealed

* Another offspring of the Nuffield Foundation's Resources for Learning Project was the Avon Resources for Learning Project (RLDV), now funded by the County of Avon, which is an excellent example of a regional resources centre.

cards, books, periodicals, "jackdaws", films, film loops, videotapes, and so on. The paper concludes:-

> "Independent learning in chemistry allows us to tailor a course of study to a particular student's aptitude and ability. It demands a change in the role of the teacher into one involving closer student/teacher interaction which should result in improved learning and development on the part of the student."

276. The Nuffield Working with Science project is another project presented in unit form designed for small group or independent learning by students aged 16+. There are 50 units, each about 28 pages long, on a variety of topics which includes Brewing, Survival, Crime Detection and Cosmetics. Each student unit is prefaced by aims and an introduction to the material and incorporates pictures, newspaper articles, photographs, and tables, together with tests, activities exercises and instructions for carrying out practical work. There are also suggestions for further work and reading.*

277. Finally, in mathematics there has been a number of curriculum development projects which have made substantial use of work cards and work sheets for independent study. "Assignment Systems", a publication of the Schools Council Mathematics for the Majority project, for instance, strongly supports the use of individual assignments based on work cards and there is a similar provision in the School Mathematics project for independent work. Another project which made substantial use of work sheets, backed up by live teaching and the use of video-taped materials, was the Hertfordshire Computer-Managed Mathematics project. Additionally this project, which was designed to teach mixed-ability mathematics in the first two years of a comprehensive school, used a computer-managed system which recorded pupil progress, suggested appropriate follow-up assignments and provided and marked sets of post-test questions.

278. There are many other examples of provision for resource-based systems within curriculum projects at secondary level. This can in part be seen as a reflection of the changes which have occurred with the introduction of comprehensive schools and the raising of the school leaving age. The problems of teaching a wide ability range, the differences in interests, motivations, learning styles and paces, together with ideas of "activity" and "discovery" have focused attention on the need to individualise lines of investigation and introduce more practical activity into the curriculum. Resource-based learning systems offer a response to these kinds of educational pressures by providing an attractive compromise between individualisation of instruction of the Keller type plan on the one hand and conventional teaching on the other.

Open Learning (Distance Learning)

279. Major projects involving open learning systems for post secondary education, are now current in twenty-eight countries apart from the United Kingdom, all using some 'mix' of distance teaching media. (18) The attractions of distance learning systems are noted by the Open University Committee on Continuing Education (19) as including the following:-

a. the devolution to the student of the major responsibility for decisions on whether, when and what to study;
b. the development of modular courses and a credit system which allow a great variety of subject combinations;
c. the harnessing of technology (eg. television, radio, telephone, video and audio cassettes) to achieve fruitful and successful individual study which allows variety and flexibility in its range and timing;
d. the opportunity to innovate and experiment, for example, in curriculum design and new types of courses;
e. the development in the remote learning context of regular and externally recognised methods of student assessment;
f. the possible economies of scale;
g. the ready accessibility of course materials to widely dispersed students who are unable to leave their places of employment or their homes to attend courses at

* For details of other courses in science which involve resource-based learning (eg. Nuffield Combined Science, LAMP, Scottish Integrated Science Course, etc.) see "Resource-based Learning in Science" (1979) Study Series No. 14, Association for Science Education.

established centres of learning;

h. the combination of materials and the local educational support of tutors, counsellors and fellow students at study centres.

280. However, despite this impressive list of advantages, distance teaching does have one major drawback from which stem the majority of problems experienced by Open University students, that of relative isolation. At Foundation level the difficulty is considerably minimised by the provision of weekly tutorials with the student's own tutor-counsellor (who also acts as assessor) in a local study centre, frequent opportunities for face-to-face contact with students following the same course, a week's residential summer school and some provision for remedial help on an individual or small-group level. However, as the Open University student progresses from Foundation level to second, third and fourth level courses, the intellectual, moral and social support substantially decreases. Because of the very great number of courses offered at post-Foundation level, the chances of a fellow student in the same locality following the same course(s) are remote. The tutorial provision in relation to that of Foundation level is greatly reduced and the tutorial will tend to be sited in areas where the nucleus of students following that course are to be found, perhaps at a considerable distance from a student's home or work. The close relationship built up with the tutor-counsellor at Foundation level tends to diminish as his/her role is reduced to that of counsellor only and the assessment function is shifted to one of the course tutors for the chosen post-Foundation course.

281. A number of techniques have, more recently, been devised to offset some of these difficulties: telephone tutorials which enable six or so students and their tutor to be simultaneously linked and provide opportunities for discussing course material and common areas of difficulty; self-help groups which meet regularly on a local basis at a student's home; and the provision of audio-taped tutorials which can be reproduced and stored by individual students.

282. If one compares a distance teaching system such as the Open University with a system such as the Keller plan, a number of differences are evident. Keller plan is concerned with mastery learning and would, therefore, be inappropriate for courses produced by the Arts Faculty at the Open University and aspects of many other courses where interpretation and open-ended learning outcomes are expected. In courses where mastery learning is relevant, such as major aspects of most science, technology and mathematics courses, immediate feedback on achievement tests is not provided within the OU system (though this could be catered for by the provision of an appointment with one's tutor at a mutually convenient time). In those OU courses where it is possible to measure attainment, computer-marked assignments are used, though, unlike in the Keller plan, the student is not present during the marking and receives his feedback about a week or so later. A similar time lapse occurs after the submissions of a tutor-marked assignment though tutors are encouraged to operate on as short a turn around time as possible and are expected to provide the student with ample and appropriate feedback by means of the script and possibly telephone as well. As with the Keller plan, these assignments occur at the end of a unit of work, but the student's further progress on to the next unit is not dependent on his successful performance.

283. More recently the Open University has introduced techniques for increasing flexibility within the system and making learning more individualised. Many courses now contain formative assignments which are used for diagnostic appraisal but not grading, while some Foundation courses offer a mock examination which serves a similar function. Other courses offer continuous assessment based on negotiation between tutor and student. An increasing number of courses contain project work which involves the student devising and carrying out a project which he/she has conceived either using a learning kit provided by the OU or resources which he/she has had to make or find, as, for example, in Art and Environment (TAD 292). Alternatively, as in the case with the new project courses, the students carry out their own surveys, experiments, and research, in which the criteria of assessment are either the research methods the student employs or the use of the design process. Computer assisted learning now features in a number of courses serving

both tutorial dialogue and simulation functions and the greatly expanded library loan system providing video and audio tapes has given students greater flexibility in relation to the viewing and listening components of courses.

284. Given the cost effectiveness and flexibility of distance learning systems such as those of the Open University, the changes in life style anticipated by the advent of microprocessors and the growing need during the 1980's for recurrent (or continuing or lifelong) education, it is not surprising that distance learning systems are already playing an increasingly important and dominant role in the future of post-school learning, particularly in the context of business and technician education.

Conclusions

285. This section has been concerned with an analysis and discussion of a range of possible instructional procedures open to a curriculum planner. For the purpose of this discussion, we have found it convenient to identify four different dimensions along which our discussion and analysis have been conducted. Each dimension is essentially concerned with a different aspect of the way in which instruction can be arranged and planned. The four dimensions were:-

Expository – Discovery
Experiential – Non-Experiential
Teacher-Control versus Student-Control of Learning Outcomes
Teacher-Based Learning versus Self-Instruction

286. It is important to stress that these dimensions are closely interrelated and that decisions about instructional procedures must of necessity involve decisions about several, if not all, of these dimensions. The first two dimensions (expository/discovery and experiential/non-experiential) broadly relate to the way in which learning can be organised and presented to the learner. The remaining two dimensions relate to the exercise of control over what is learnt in the classroom and how it is learnt.

287. In discussing the relationship and inter-dependence between these dimensions, the final dimension (dealing with teacher-based learning versus self-instruction) need not be considered here in detail. The reason for this is that practically all the curriculum projects that were examined in the course of this study subscribed to the teacher-based end of the spectrum in this dimension. The trend towards the acceptance of self-instructional procedures, although adequately developed at the higher education level, has so far not moved significantly into curriculum development work as it relates to the secondary education field.

288. It is also probably justified to claim that early decisions made about instructional strategies as they appeared in curriculum projects, were made almost entirely on pragmatic grounds and on firmly held beliefs. This claim is based on the fact that throughout the period of curriculum development covered by our analysis, predominance was given to the adoption of teaching strategies based on the discovery or guided discovery model and few detailed justifications could be discerned from the literature as to the particular reasons for this choice. It is also our view that as a comcommitant of this feature, a number of assumptions emerged about the interrelationship between the discovery versus expository dimension and other dimensions covered in our analysis for which relatively little support exists. In order to examine these particular assumptions we will now proceed to a detailed discussion of the relationships, in so far as they exist, between these dimensions. To facilitate this analysis we have summarised in Table 3 (overleaf) the salient characteristics as regards the three remaining instructional dimensions associated with a number of representative curriculum development projects. In preparing this table, we have rated the position of the nine curriculum projects along the three dimensions, using a very crude assessment, for example, indicating whether the degree of experientialism in a project may be regarded as high, medium or low.

289. Looking first at the relationship between the expository/discovery dimension and the experientialism dimension, it 's seen from the table that generally a high emphasis on discovery seems to be accompanied by a high degree of

	Discovery Learning	Experiential Orientation	Teacher-Control of Outcomes
Humanities Curriculum Project (HCP)	High	High	Low
Integrated Science Project (SCISP)	High	High	High
Geography 14-18 Project	Medium	Medium	High
Design and Craft Education Project	High	High	Medium
Modern Languages Project	Low	Medium	High
Nuffield 'A' level Science Projects	Medium	Medium	High
Salop Maths Project	Low	Low	Medium
Integrated Studies Project	Medium	Medium	Low

Table 3: Ratings of Selected Projects Along the Discovery, Experiential and Teacher-Control Dimensions.

experientialism built into a project. This is basically as would be expected because the experience gained by the student generally forms the basis on which insights are gained by him and new knowledge develops. Attention has already been drawn elsewhere to the fact that subjects can vary considerably in the extent to which they lend themselves to an experiential approach. It is, therefore, not possible to make absolute comparisons between the degree of experientialism displayed by the different projects. However, it is abundantly clear that projects such as the Salop Mathematics project listed in the table and, indeed, many other mathematics projects provide only a relatively low amount of experiential learning for the student. Other subjects occupy what might be called a central position along the spectrum, for example, the 'A' level science projects and the modern language projects. It is to be noted that even when within a particular teaching approach along the discovery/expository dimension, different degrees of experientialism are possible. We also note that the more a project is oriented towards lower ability students, the larger tends to be the emphasis on the introduction of pupil activity as an instructional feature. In other words, there appears to be a tendency towards increased experientialism for lower ability students and a reduced degree of experientialism for higher ability students who, it is thought, are capable of coping with a more theory-oriented teaching approach involving a lower degree of experientialism.

290. The next relationship to attend to concerns the discovery/expository dimension in relation to the extent and degree of teacher-control or pupil-control of learning outcomes. It is a common fallacy to equate a commitment to discovery learning with a teaching approach which inevitably reflects a high degree of "open-endedness" in relation to the learning outcomes to emerge from it. As the comparison between the HCP and SCISP projects clearly indicates, both projects have a high degree of commitment to the pursuit of discovery learning but vary most decisively as regards the control exercised over learning outcomes. In the HCP, for example, the degree to which teachers control the actual learning outcomes of their pupils is relatively low. The reasons

for this have been discussed elsewhere and it may suffice here simply to indicate that in the type of learning experience offered by HCP, students are required to make their own individual responses and these must, of necessity, differ from each other. In contrast, the control of learning outcomes within the SCISP programme is highly defined in an *a priori* way, on the basis of objectives and curriculum goals and these form the focal point on which the teacher directs his activities and thus, controls the students' learning outcomes. It should be noted that the extent of teacher- or pupil-control exercised over learning outcomes appears to be largely independent of the actual instructional strategy chosen. As can also be seen from Table 3, two projects in both of which the commitment to a teacher-based control of learning outcomes is high, SCISP and the Salop Mathematics project, differ very significantly in the instructional strategy chosen; the first falls clearly within the discovery end of the first dimension, whereas the second is heavily oriented towards the exposition end of the spectrum.

291. We would also want to point out that, at least in theory, some additional features may exist. For example, different degrees of experientialism may appear in relation to a teaching approach which otherwise is heavily oriented towards the expository end of the spectrum. If practical work in science or craft and related subjects were used predominantly to illustrate and amplify concepts and principles already known to the student, then under these circumstances the experientialism, although high, would not have the function of forming a data base from which the student can derive additional knowledge and further insights. Rather, it would merely serve the purpose of consolidating his already existing knowledge. We were unable to discover any such situations within the range of projects investigated by us and would indeed question whether any such situations were currently in existence. However, we consider this particular combination of low discovery and high experientialism to be perfectly legitimate and even desirable in the context of, for example, vocational and occupational training.

292. Instructional procedures represent a means whereby curriculum intentions are fulfilled. These curriculum intentions may either be couched in statements which describe student learning outcomes or in statements which describe the pedagogical activities to be undertaken by the teacher. Underlying the choice of instructional procedures (no less than that of aims, goals and so on) are the perceptions which the curriculum planner has of the nature of the subject matter and of the characteristics of the learner. These perceptions should enable him to make sound and well-informed choices about instructional strategies rather than leave this choice to pragmatic considerations.

293. We hope that the analysis presented here will be of interest and value to potential curriculum developers in further education. Given the task of decision-making about which instructional strategy to adopt, the curriculum developer ought to address himself, we suggest, systematically to the four dimensions identified in this study. He should ask himself whether, in view of the particular situation for which he is planning, an orientation towards discovery learning is preferable to an orientation towards expository teaching or *vice versa*. Likewise, he should attempt to make a rational judgement about the degree to which experientialism in its various types is educationally desirable and possible in his particular circumstance. He should also be able to make a realistic assessment of control aspects, irrespective of whether they relate to learning outcomes or to the learning activity itself.

294. We believe strongly that the selection of instructional procedures must be the result of deliberate choice and not a matter of pragmatism. We, therefore, offer Table 4 as a final example which, it is hoped, will indicate how such a choice can be made.

Perceived Nature of Subject	Likely Nature of Statements of Curriculum Intentions	Likely Consequences for Choice of Instructional Modes		
		Expository/Discovery	Experiential Orientation	Control of Learning Outcomes
→ Highly structured with well-defined content (concepts and "process" items)	Strong emphasis on learning goals and objectives	Often a significant degree of expository instruction is discernable; discovery learning activities are strongly oriented towards pre-determined objectives.	Variable, depending on whether the subject is perceived as "theoretical" or "practical".	Extensive teacher-control, with little or no scope for "open-endedness".
→ Emphasis on conceptual Structure of subject.	→ Concepts to be learned are usually well-defined by external agencies or consensus			
→ Emphasis on "process" items	→ Process skills are generally well-defined by consensus	Guided discovery and discovery learning procedures are used, with orientation towards practice of process skills.	Usually high, for the purpose of providing "concretised experiences".	Teacher-control (of learning activities). Some "open-endedness" in relation to the conceptual parts of the subject.
(Examples: formal Science subjects, Mathematics)				
→ Loosely structured with emphasis on broad concerns and issues, rather than well-defined content of concepts or process items.	Main emphasis is on the specification of teaching procedures and instructional conditions.	Pronounced degree of discovery, mainly in terms of "self-discovery".	High, involving all modes of experiential learning.	Extensive student-control; learning is often "open-ended" because of the personalised response made by learner to the teaching situation.
(Examples: Social and Life Skills, Humanities)	'Standards' of learner performance or achievement cannot be externally determined.			

Table 4: The Selection of Instructional Procedures – some exemplars.

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Chapter 6 – Evaluation and Assessment

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Evaluation and Assessment

Introduction

295. Evaluation as an educational concept relates to the identification, description and appraisal of the effects and effectiveness of an educational intervention. The term "intervention" in this context is used to embrace all aspects of teaching/learning whether they are brought about by curriculum development or result merely from a change in educational strategies and teaching approaches (for example, through the use of educational technology).

296. Two major foci generally exist in evaluative work. One focus is the student whose learning is to be assessed; the other is the wider context of education which includes not only the student but also teachers and relates to the instructional processes used and the learning environment established, as well as to the aims and goals of the educational intervention.

297. For the purpose of this discussion we shall use the term *evaluation* to denote activities concerned with an "appraisal of a learning situation", whereas *assessment* relates chiefly to an appraisal of students' performance or achievement as it results from their exposure to an educational experience. Thus, student assessment will normally be part of an evaluation procedure, but it must be recognised that student assessments (including examinations) also have functions which lie outside the area of evaluation. Such functions include, for example, the comprehensive grading of students to furnish a basis for the selection of students for educational and vocational careers.

298. Curriculum evaluation has, over the past decade or so, become a field of considerable complexity and diverse practices. A systematic review and analysis of the various evaluation strategies suggested and employed in actual curriculum attempts would constitute a task beyond the scope of this study. Thus, we confine ourselves to brief comments on the extent and nature of the procedures that have been used for the evaluation of some of the secondary level curriculum projects which we have reviewed in this study. These comments are presented in paras 300-313 of this chapter, with references to literature relating to aspects of curriculum evaluation.

299. In paras 314-418, issues relating to assessment and examinations are discussed. Our justification for devoting special attention to this area is twofold:-

a) the assessment of student performance and achievement constitutes a major component of the evaluation of most courses or curricula; furthermore, since the assessment and examination of students form a major area of responsibility for teachers at all levels, a discussion of aspect relating to them is fully justifiable;
b) recent curriculum development work has, in a number of instances, led to the development of new assessment or examination procedures. These developments, although not forming part of the curriculum innovation itself, are nonetheless sufficiently closely linked to it to merit review and discussion here.

Curriculum Evaluation

300. In contrast to the USA, where practically all government-funded curriculum projects made provision for their evaluation in a formal manner, most curriculum projects in Britain have paid relatively little attention to evaluation in the formal sense and tended to accept informal feedback as an adequate indication of a project's success. In the majority of cases, such evaluation attempts as have been undertaken were *formative* in nature and, hence, part of the curriculum development process *per se*; by contrast, *summative* evaluations designed to assess a project's overall impact have been rare in Britain.

301. A not unexpected consequence of the relatively low importance accorded to curriculum evaluation in Britain is the fact that relatively few evaluation studies are available in published form. Of the reports that have been published, the most comprehensive is the Schools Council's volume on "Evaluation in Curriculum Development: Twelve Case Studies" (1). This provides information on ten of the projects covered in our review, including the Schools Council

Integrated Science project (SCISP), the Schools Council Humanities Curriculum project and Project Technology which have featured in our own detailed studies. Other valuable evaluation studies are "Inside A Curriculum Project" (2) which relates to the Schools Council's Integrated Studies project, the review articles "Evaluation and Science Curriculum Projects in the UK" by Tawney (3), "Some Recent Evaluation Studies of Curriculum Projects" by Eraut (4) and the recent Schools Council report on its "Impact and Take-up Project" (5).

302. The choice and adoption of suitable evaluation procedures must play an important role in assessing both the progress and the eventual outcomes of curriculum innovations. The reports mentioned in the preceding paragraph between them exemplify a variety of different evaluation strategies. It is important to stress that different evaluation procedures have different strengths and weaknesses, and that such strengths and weaknesses should be adequately considered by potential curriculum evaluators. A most useful document for this purpose is the Schools Council booklet "An Introduction to Evaluation" (6). This publication explains different styles of evaluation, points to some of the special constraints evaluators may experience and outlines the various evaluation strategies open to them. We recommend it as an excellent starting point for the potential curriculum evaluator.

303. Although we do not propose to discuss theoretical issues concerning evaluation styles or strategies, we consider it important to comment briefly on the following questions:-

i. What is or should be the purpose of the evaluation?
ii. What qualities should the evaluation encompass?
iii. When should the evaluation be conducted?
iv. Who should be the evaluator?

Whilst there is wide agreement among evaluation specialists about the answers to some of these questions, in other instances matters are still, and are likely to continue to be so, the subject of academic debate. As a consequence, although we shall now attempt to draw attention to some of the underlying issues, we also realise that no definitive answers can be given to the questions posed.

The Purpose(s) of Evaluation

304. The purposes of an evaluation will depend on whether the evaluation is seen as formative or summative. In the case of a formative evaluation, information is sought about how an experimental course or curriculum is operating and what changes, if any, should be made to it. As has already been stated, formative evaluation is an integral part of the curriculum development process *per se*. The overriding purpose of a formative evaluation is to help the curriculum developer in his decisions about how to improve his project.

305. Summative evaluations are essentially geared to already developed programmes and so cannot serve as a basis for modifying an existing and on-going development project. This, of course, does not preclude the use of summative evaluation data in decision-making about future developments. By and large, summative evaluation seeks to provide information about the changes brought about by educational innovations. Such information is of interest not only to the curriculum developer but also to educational administrators, parents, the community and, indeed, politicians.

The Qualities to be Evaluated

306. These must inevitably depend upon the purpose of an evaluation attempt. Formative evaluation tends to focus primarily on two aspects:-

a. the acceptability of the aims, goals and objectives of a project, and their feasibility in the actual teaching context;
b. the extent to which a curriculum is successful in the sense that its goals and objectives are achieved or that it brings about desired changes in, for example, pedagogical practices.

307. Summative evaluation, whilst often embracing these two points, focuses on a wider range of issues, for example:-

c. it may wish to establish the overall effects of

an innovation and thereby provide information that may make the further implementation of the innovation more effective;

d. it may aim at generating information and data which enable administrators and others to make informed decisions about the choice of curricula;
e. it may seek to establish the long-term effects of novel educational practices and procedures often associated with curriculum innovation, in terms of variables such as manpower supply and the quality thereof.

308. Depending on the scope chosen for an evaluation, the evaluator may wish to gain information about the following aspects of a curriculum:-

1. effects on the learner (cognitive, affective and psychomotor);
2. effects on teachers, and the professional demands made on them;
3. effects on internal school/college administration and on external administration;
4. effects on employers and further/higher education;
5. views held by parents and others in the community;
6. financial and resource implications;
7. demands on initial and inservice training of teachers, etc.

In addition, evaluations may focus on changes in the styles of teaching and learning brought about by curriculum influences. Usually changes of this type can only be evaluated in classroom-based studies and are, therefore, less directly discernable than some of the more obvious effects of curriculum innovations.

309. In recent years, progressively more attention has been focused on the assessment not only of the intended outcomes of curriculum innovation, but also on a wide range of *possible* outcomes. It has been argued that in widening the scope of an evaluation, we may uncover some consequences that ought to be considered in a final appraisal of a programme's value. This, of course, can be achieved only if the importance of comparative longitudinal data in evaluating the affectiveness of educational treatments is recognised and if evaluative procedures are employed which take into account the interaction between student-, process- and environmental variables which produce differential results in learning (7).

The Timing of the Evaluation

310. The question of when an evaluation should be conducted depends generally on the nature and purpose of the proposed evaluation. In the case of a formative evaluation, it is highly desirable that curriculum development and evaluation should proceed alongside each other so that the latter can contribute positively to the development task. Such contribution does not merely arise during the conduct of curriculum trials; it can be achieved much earlier in the curriculum development work, for example, through the evaluator's involvement in the formulation and articulation of curriculum intentions and goals. Thus, evaluation should be planned as an integral part of a development project. Experience has shown that *ad hoc* arrangements are generally far from satisfactory.

Choice of the Evaluator

311. Evaluation is a human, judgmental process and it is difficult to eliminate personal biases from judgments about the strengths and weaknesses of a curriculum. Thus, the question of who should be a curriculum evaluator is of major importance, especially in summative evaluations. In practice, several possibilities arise which may briefly be considered:-

a. *The curriculum evaluator is a member of the curriculum development team.* The obvious advantage of this arrangement is that the evaluator, because of his involvement in the curriculum development process, will have first-hand knowledge of the project's aims and intentions as well as the mode of operation of the project team. Thus, a close relationship between development work and evaluation activities

can, at least in theory, be achieved. However, there are negative aspects to this type of arrangement: the evaluator is, or may be thought to be, committed to the "success" of the project to be evaluated by him, and this may influence and colour the judgments made by him. In particular, a tendency towards "self-justification" may exist.

It should be noted that a number of secondary level curriculum projects reviewed by us employed project team members as evaluators, during the formative phases of the development (eg. the Schools Council Sixth-Form Mathematics Curriculum project and the Nuffield A-level Biological Science project). Although this kind of arrangement may be less problematical in a formative evaluation than in a summative evaluation, the danger of biases in judgment still exist and may affect the degree to which project proposals are modified following trials.

b. *The curriculum evaluator is an independent person.* Whilst this kind of arrangement removes the apparent danger of biases as outlined above, it is itself not without potential problems. The evaluator may lack insight into the intentions of a curriculum team. He may also wish to apply evaluation strategies which are not fully compatible with a project's intentions; for example, an evaluator who leans strongly towards outcome-related measurements may not do justice to an evaluation of variables relating to the educational process *per se*. There is also a potential danger that a professional evaluator may see evaluation as a research activity in its own right, rather than as something which, at least in the case of formative evaluations, should contribute to the development programme as a whole. Some of the strengths and weaknesses of independent evaluations are revealed by two relevant examples. One is the evaluation of the Nuffield Secondary Science project (8). Tawney, in reviewing this evaluation attempt (9), comments aptly: "the isolation of the evaluator is clear ..... It is difficult to understand the purpose of the study: the area under study was too narrow, it was conducted too late to be used formatively ..... and it was presented in a form unlikely to affect teachers and authorities about to invest in Secondary Science".

An independent evaluation which does, in contrast, provide a great deal of valuable information not only about the organisation of a particular project and the team's relationship with the trial schools but also about the process of curriculum reform in general, is Marten Shipman's study of the Schools Council Integrated Studies project, *Inside a Curriculum Project* (10). This particular study is also interesting in that it provides numerous examples how the evaluator's interpretation of the events observed differed from that of those on the inside and also how the insiders differed between themselves.

c. *"Adversary group" approach to curriculum evaluation.* This is an as yet untried approach to the evaluation of curriculum innovations, but offers interesting possibilities. It involves the appointment of at least two evaluators in an attempt to balance their biases and expertise. The basic assumption underlying the adversary groups design is that biases held by individual evaluators need not be suppressed and can actually enhance the quality of the evaluation.

312. In raising questions about aspects of the educational process and becoming involved in commentaries about "good" and "bad" practice, evaluators inevitably concern themselves with value issues. It has been suggested elsewhere (11) that "by questioning the value of aspects of schooling, evaluation has entered a field in which it is not always sure of its responsibilities" and that evaluators need to make their values explicit so that the bases for their judgments can be opened up to public scrutiny.

313. This reluctance to use techniques which can be checked by others, coupled with the complex and sometimes ill-defined problems to be overcome, may explain why well planned evaluation studies are too often conspicuous by their absence. Although it must be accepted that evaluation is a secondary activity in the development of curricula, it is still an important activity and should be given appropriate priority by the curriculum developer. Whilst steps need to be taken to increase the proportion of competent evaluators, it is also important, particularly at a time when centralised curriculum development has given way to more localised activities, to provide more in-service training in evaluation studies. In that way teachers can be stimulated to look critically at their own work and also to respond more positively to the judgments of an external evaluator, whenever the need arises.

Assessment/Examination Procedures

Background Comments

314. As previously indicated, recent curriculum development work has brought about a substantial reappraisal of both assessment and examination techniques. The reason for this is that the close interaction between teaching and assessment was firmly recognised by curriculum developers, and hence, numerous examples can be found where deliberate attempts have been made to make assessment and examination procedures supportive of the aims and objectives of new courses and curricula, insofar as these relate to students' performance. However, before undertaking an analysis of assessment procedures, it is important to put them in context. In this section, we shall briefly consider issues such as the functions of assessment and the qualities to be assessed.

Functions of Assessment

315. All modes of assessment (including examinations) seek to measure student performance in various areas (intellectual skills, practical skills, attitudinal qualities, etc.), but the uses to which the resulting information is put can be broadly divided into two categories:-

a) assessment for diagnostic purposes;
b) assessment for the purpose of grading students.

316. If assessments are conducted for diagnostic purposes, information is generally sought about the extent to which a student has mastered particular skills, acquired particular abilities or developed certain interests or attitudes. Ideally, such assessments should be made with reference to standards or criteria imposed externally, for example, through the specification of curriculum objectives. If this is done, the measurement of students' competences becomes *criterion-referenced.* Criterion-referenced testing is, of course, not confined to diagnostic assessment procedures but can, at least in principle, be equally usefully employed for the indispensible component of diagnostic assessments.

317. The assumption underlying the diagnostic appraisal of student performances is that once students' strengths and weaknesses have been identified, appropriate pedagogical actions can be taken by the teacher to remedy any deficiencies. In the context of curriculum evaluations, especially of the formative type, diagnostic assessments of student achievement provides the curriculum developer with direct access to information about the effectiveness of his programme.
References (12) and (13) give useful information about the merits and practical aspects of diagnostic testing, and the reader's attention is drawn to these.

318. Assessments conducted for grading purposes, especially those involved in formal examinations, tend to establish the performance of students relative to that of other students. If this happens, the assessment may be said to be *norm-referenced,* reliant on comparing one student's achievement with that of the next, rather than on measuring such performances with reference to externally imposed criteria. Although most formal assessments used for grading purposes would not be fully norm-referenced, in that they also employ some degree of criterion-referencing, they nevertheless seek to achieve maximum discrimination between students in terms of the marks gained by them. This means

that the rank-ordering of students usually receives priority over the assessment of their actual competences and capabilities. In consequence, assessment procedures used primarily for grading purposes have only limited usefulness as a source of feedback for curriculum workers.

Qualities for Assessment

319. These may broadly be divided into three areas:-
   a. qualities representing intellectual abilities or problem-solving skills, etc. These may be termed *cognitive abilities* (Bloom 14);
   b. qualities relating to attitudes, personal beliefs and values, interpersonal relationships, aesthetic and ethical judgments, etc. These are *affective characteristics* (Krathwohl *et al.*15);
   c. qualities concerning skill performance in the broadest sense, in connection with practical activites, for example, in the sciences, craft and related subjects. These are referred to as *psychomotor skills.*

320. The assessment of cognitive skills and abilities has been the subject of much research and development work much of which has found its way into operational examination and assessment procedures. Thus, a detailed discussion of such assessment procedures is unnecessary in the context of this analysis. However, this is not so for the other two areas, concerned respectively with the assessment of affective characteristics and of psychomotor skills. Development work in these areas has been less influential on operational assessment techniques used in, for example, public examinations. Therefore, more detailed discussion of the assessment of affective characteristics and psychomotor skills is provided in this chapter in the hope that this may stimulate experimentation in further education.

Modes of Assessment

321. By "modes of assessment" we mean the different techniques and strategies that may be employed in the conduct of assessments and examinations, rather than the content and purpose of the assessment and the particular qualities to be assessed.

322. For the purpose of the present analysis, a classification system is adopted which considers the context in which the assessment arises and the type of assignment or activity to which it relates. In principle, two possibilities arise:-
   a) the assessment is based on an evaluation of students' performances on assignments and/or activities which are specifically designed for the purpose of assessment (Type *a* assessment);
   b) the assessment is based on the evaluation of students' performance on assignments and/or activities which are primarily planned as an integral part of a learning experience (Type *b* assessment).

323. For type *a* assessments, the following activities are usually used:-
   i) written examinations or tests in their different forms*;
   ii) oral examinations and formal interviews;
   iii) practical examinations or tests;
   iv) special "assessment" projects, etc.

Essentially, all these activities are normally created in order to allow students' performances to be gauged and so have no direct function and role as learning experiences from which the student can derive new knowledge and skills or which help him to consolidate existing ones.

324. Type *b* assessments are made in relation to work undertaken by students in the course of their normal educational programme. The nature of such work may vary from discipline to discipline, but may include the following:-

   i) course essays and seminar papers;
   ii) practical work or field work;
   iii) discussion contributions to seminars and tutorials;
   iv) projects and investigations.

* These include essay-type and short-answer (structured) questions, multiple-choice objective tests, open-book examinations, etc.

325. The distinction made here between type *a* assessments and type *b* assessments is not just one of convenience, but concerns the nature and quality of the information that may be derived from them.

326. When type *a* assessments are conducted, the assumption is usually made that the student has completed the learning experience. Thus, assessment will constitute a test of how well, or otherwise, the student has learned from the course or a particular course component and of the skills and competences acquired by him. In brief, type *a* assessments generally establish students' *terminal* achievements.

327. By contrast, assessments of the second type (type *b)* cannot establish terminal achievement in that they relate to activities or assignments which are themselves part of a student's learning programme. The information gained from type *b* assessments relates primarily to a student's progress in a course of studies. Whilst they may be used to monitor a student's pattern of work input or the regularity with which course work is carried out, and so on, they cannot establish the person's terminal skills and abilities.

328. The foregoing should also be borne in mind when the potential use of the various modes of assessment is considered for evaluation purposes. Modes that fall within the type *a* category are likely to yield better and more reliable information about the effectiveness of an educational programme than type *b* assessment modes.

Some Issues of Terminology

329. In discussions of examination and assessment procedures, frequent use is made of terms such as "continuous assessment", "in-course assessment", "terminal assessment", "periodic assessment", and so on. Although these terms usually given an approximate idea of the meanings attached to them, their precise meanings often remain undefined. We have adopted the following terminology:-

a. *Continuous Assessment*
Continuous assessment may be defined as the evaluation of students' work done during the course programme (eg. essays, laboratory work, field work). Often this assessment is undertaken by an independent staff member, in addition to the tutor responsible for setting the work. When properly executed, continuous assessment can be extremely demanding on both students and staff: in the case of the former, it requires a substantial amount of regular work to be done throughout the course; for the latter, the high demand results from high involvement in assessments and the moderation of marks.

b. *In-course Assessment*
Although this term is sometimes used as a synonym for "continuous assessment", it is imprecise: it merely refers to the timing of assessments and indicates that an assessment is conducted whilst a course is still in progress (as opposed to a "terminal" assessment which is conducted following the *completion* of a course). In-course assessments may involve the evaluation of assignments and activities which are designed specifically for assessment purposes, as well as the assessment of work done as an integral component of a learning experience.

c. *Terminal Assessment*
This refers to assessments conducted at the end of (ie. subsequent to the completion of) a course. The purpose of terminal assessments is usually to establish students' final achievement in a course, although at times such assessments are also used for the purpose of course evaluation. It should also be noted that terminal assessments may occur *during* an educational course when such assessments relate to course units or modules which, although forming part of a wider course, are complete in themselves. In view of their characteristics, terminal assessments constitute type *a* assessments (see above).

Advantages and Disadvantages of Different Assessment Procedures

330. Practically every mode of assessment affects the work of students and academic staff. These effects may be positive or negative ones, and it is important for teachers and lecturers to be aware of the strengths and weaknesses of different assessment procedures, as well as their potential for measuring particular qualities.

331. A detailed discussion of the potential advantages and disadvantages of different assessment methods is beyond the scope of this analysis. Our aim in referring to the existence of such advantages and disadvantages is to encourage potential curriculum workers to make balanced judgments when selecting assessment techniques for their particular purposes.
An extensive analysis of advantages and disadvantages associated with different assessment methods may be found in the reports identified in references (16) to (19).

An Analysis of Assessment Procedures

332. In the main, we are considering here assessment procedures which relate to the secondary education sector because it is here that most developments have taken place in recent years. Credit for this progress must go largely to the examination boards, especially the GCE Boards which initiated and undertook much development work in connection with their own examinations, and also to the Schools Council for their commissioning of a wide range of studies of different assessment and examinations procedures.

333. Generally, this development work has concerned *external* examinations conducted and controlled by agencies which are external to the educational institutions preparing students for examinations. Without doubt, the "external" nature of many examinations imposes constraints on the procedures and techniques that can be used in them. For example, the requirement that external examinations should be easy to administer and mark has led to the widespread acceptance of written examinations as the primary mode of assessment. Likewise, the quest for "comparability of results" has entailed the adoption of assessment techniques which are considered to be highly reliable, in preference to others. A recent innovation in certain GCE 'A' level courses in the sciences has been the introduction of teacher-based assessment as an alternative to conventional external practical examinations. Issues and problems associated with this innovation will be discussed.

The Assessment of Cognitive Abilities

334. Traditionally, educationalists have placed a high premium on the development of cognitive skills and abilities, ie. intellectual qualities relating to, for example, the acquisition of knowledge, of problem-solving skills, and so on. This emphasis is reflected not only in the nature of teaching approaches widely adopted but also in the examination and assessment procedures in common use. In these, a preoccupation with the cognitive outcomes of the educational process is still discernible, despite the fact that recent curriculum work has increasingly drawn attention also to the importance of non-cognitive abilities.

335. A review of contemporary assessment and examinations procedures, especially those used in the context of the public examinations (CSE and GCE) points to a series of significant changes and innovations over the past two decades. One of these is that most examining boards now make explicit the range and nature of the skills and abilities which their examinations aim at testing. This is often done in the form of statements which express:-

(i) teaching and examination aims and objectives, the latter frequently sub-divided into varying levels of skills and abilities which are to be tested;
(ii) the weighting accorded to the various skills and abilities.

336. Since, as previously indicated, this is an area which has been both well researched and documented, we propose to restrict our analysis in the remainder of this section to current trends in the secondary sector, with particular reference to written

examinations. Some mention will also be made of oral examinations and their potential.

Types of Cognitive Ability to be Assessed

337. Statements of examination objectives in many GCE and CSE syllabuses indicate that students' cognitive abilities are often assessed at the levels of intellectual functioning as they are broadly reflected in Bloom's Taxonomy (14). Adherence to this (or any similar) taxonomy facilitates the development of examinations using a standardised and reproduceable distribution of weightings of abilities and of question types. The use of the taxonomic system by Bloom has been particularly widespread in relation to objective type multiple-choice examinations.

Review of Current Procedures and Techniques

338. The most marked development in the field of written examinations over the past decade or so, has been the introduction and acceptance of "objective type" examination techniques. These are chiefly of two forms:-

i) multiple-choice type tests;
ii) short-answer or structured answer tests.

339. The traditional essay-type examination technique is still widely used, but usually in combination with the objective type examination techniques mentioned. But, a number of interesting variants have been explored, for example, open-book examinations in which the student has access during the examination to books and other resource materials, or "prepared question" examinations where students are given advanced information about the questions to be tackled in an examination and can so prepare for them.

340. An important point to be made here is that it is generally recognised that different examination and assessment techniques have different potential for measuring different ability and skill levels. Thus, multiple-choice and short-answer questions tend to be preferred for testing the "lower" intellectual skills and abilities, whilst essay-type questions are still seen as the main means of examining higher level abilities. However, it is worth stating that this use of different types of question for different purposes is, at least to some extent, a matter of practical convenience rather than an intrinsic property of the question types themselves. Nevertheless, in practice GCE examination boards make use of different question types for different purposes. This is clearly seen from Table 5 which summarises the main methods of assessing cognitive skills in written examinations set by GCE boards in different subject areas.

341. It can be seen from Table 5 that the GCE boards now make widespread use of a mixture of assessment techniques. (The same practice has, incidentally, been adopted by CSE boards.) The different elements of this mixture usually serve different functions, such as the measurement of different levels of cognitive attainment, but also offer other advantages. For example, multiple-choice and short-answer questions allow a substantial syllabus coverage to be achieved in examinations, whilst essay-type questions can be used to examine in depth particular subject areas.

342. The Schools Council Examinations Bulletin No. 4 (1964) makes the point that "all examinations should employ as nearly as possible the same medium of expression as that in which the pupil or student will eventually make use of his attainment". In view of the fact that most people spend more of their life speaking than they do in writing and practical activities, one might have expected to see a considerable extension of oral assessment in recent years. This has not been the case. Oral assessment is still under-used and is limited to a narrow range of subjects, notably the foreign languages. The techniques of oral examining in these areas have not changed very much over the years. Attempts to extend the use of oral examining to other subject areas, such as chemistry, geography and history, have not met with much success, despite some fruitful development work (20).

343. There is some evidence that oral examining can play a small, but significant, part in the school-based assessment of project work. In the experimental "Studies in Design" examination (which

STUDY AREA	TYPES OF TEST USED	COGNITIVE ABILITIES ASSESSED
Business Studies 'O' level	1. Objective tests and/or 2. Short-answer tests 3. Comprehension-type (in which stimulus material is supplied and questions based on it) 4. Essay-type	Factual recall; comprehension; application and occasionally analysis and synthesis Analysis and application Analysis, synthesis and evaluation
Economics 'A' level	1. Objective questions 2. Structured questions on comprehension passages 3. Structured questions on trade figures, extracts from reports/ articles 4. Essay-type	Knowledge (understanding of total syllabus) Comprehension and application of of economics Analysis, application, synthesis, evaluation Whole syllabus in depth; demonstration of higher cognitive levels
Engineering Science 'A' level	1. Data response/comprehension 2. Longer problems	Interpretation and comprehension of information. Evaluation, application and synthesis of knowledge
English Literature 'O' level	1. Questions based on passage of prose/poetry 2. Essay-type	Comprehension, analysis, evaluation All levels but particularly higher levels
Environmental Studies 'A' level	1. Structured short-answer questions 2. Essay-type	Recall and application of knowledge Application, synthesis and analysis of knowledge
Geography 'O' level	1. Multiple-choice 2. Data response type (structured questions) 3. Essay-type	Factual recall and understanding Application, analysis Analysis, synthesis, evaluation
History 'A' level	1. Comprehension/data response type (based on historical documents) 2. Essay-type	Interpretation and application of information and knowledge Higher cognitive abilities
Languages 'A' level	1. Oral/aural 2. Essay-type (literature) 3. Translations of prose	Comprehension/application of knowledge Skills at all levels Comprehension/application
Mathematics 'O' level	1. Multiple-choice questions (all compulsory) or short-answer questions 2. Problem/questions (choice)	Basic manipulative skills in mathematics Test of advanced skills requiring "deeper continuous thought"
Science Subjects 'O' level	1. Objective tests and/or 2. Short answer/structured question tests 3. Essay-type questions	Factual recall: knowledge and understanding of syllabus as whole Higher level abilities
Social Science 'O' level	1. Short-answer questions 2. Stimulus material and questions 3. Short-essay answers 4. Long-essay answers	Recall of knowledge Analysis, comprehension Broad coverage of middle level skills In depth coverage of higher level skills
Sociology 'A' level	1. Short-answer questions based on stimulus material 2. Essay-type	Comprehension and application of knowledge Analysis, synthesis, evaluation

Table 5: Examples of Methods of Assessing Cognitive Skills Used in GCE Examinations.

is used in conjunction with the Schools Council Design and Craft Education project) and in an assessment scheme proposed by Deere (21) for the Schools Council Project Technology, the requirement is "that the candidate be interviewed about his part in a group project in order to ascertain that he/she understands all that has taken place and that his/her contribution in the project has been reasonable."

344. Oral questioning also plays a significant role in the internal assessment procedures recommended by a number of curriculum projects which have not been formally linked to an examination leading to external certification. For example, the Integrated Studies project of the Schools Council recommends the use of oral questioning. Other projects that have advocated the use of oral questioning are the Schools Council Humanities Curriculum project and the North West Regional Curriculum Development project, but in these cases oral work is often used for diagnostic purposes.

345. Earlier in this chapter the reader's attention was drawn to a number of texts dealing with various aspects of the assessment of cognitive abilities. In addition to these, two other relatively recent books may be mentioned as being of interest. These are *Assessing Students: How shall we know them?* by Rowntree (22) and *Assessment in Schools* by Satterly (23). The latter is particularly useful in that it includes a section on the work of the Assessment of Performance Unit which was established by the DES to:-

1. identify and appraise existing measuring instruments and methods of assessment;
2. sponsor the creation of new instruments and assessment methods;
3. promote with teachers and LEAs the conduct of experiments;
4. identify significant differences in achievement, particularly underachievement, and relate to the circumstances of learning, making the information available to those who allocate resources in the DES, schools and LEAs.

To date the assessment of Performance Unit has concentrated on attainment in languages (reading, writing, spoken English and the study of foreign languages), mathematics (communication through numbers, graphs, models and diagrams) and science, but it is likely that this work will be extended to other areas also. The focus of the APU's investigations is the school sector; nevertheless, interest in this work should extend to the further and higher education sectors also.

The Assessment of Affective Characteristics

346. Practically every curriculum project undertaken over the past twenty or so years purports to be concerned, at least in part, with the development in the learner of characteristics which fall outside the broad area of intellectual and psychomotor skills. These are *affective* characteristics as referred to in para. 319.

347. Affective qualities referred to in curriculum projects, and occasionally also in examination syllabuses and assessment schemes, vary widely in nature and type. Broad terms such as "development of character", "social awareness", "social interaction skills", "empathy", "aesthetic qualities", "attitudes", "interests", "feelings" and many others have been used to express desirable affective characteristics to be developed in the learner. Whilst these terms may convey impression of the nature of affective qualities, curriculum developers have generally not attempted to give precise and detailed elaborations or descriptions of the meanings attributed by them to these terms.

348. The lack of such elaborations poses a major problem for those wishing to assess students' affective characteristics. The problem concerns the translation of broad terms like those above into meaningful statements of the way in which such characteristics manifest themselves in students' overt behaviour that is accessible to observation and scrutiny by an assessor. It may be argued that without an *a priori* clarification of the behaviour patterns which are deemed to be associated with particular affective characteristics, no objective assessment of students' affective qualities can be undertaken. This point is elaborated later in this section.

Types of Affective Characteristic

349. As already indicated, curriculum developers vary widely in their usage of and in the meanings they attach to terms expressing affective characteristics. Also, it is by no means certain that general agreement exists about what constitutes affective qualities. Therefore, an attempt is made here to develop a classification system for different affective outcomes which have been advocated in different curricula.

350. Without wishing to engage in a philosophical analysis, we propose three main categories under which affective characteristics may be classified:-

a. affective characteristics relating to social and societal goals and values;
b. affective characteristics which pertain to an individual's personal values and beliefs, and to his character and personality;
c. affective characteristics which are associated with particular subjects or disciplines, with their pursuit and with values and beliefs relating to them.

351. Only a few examples can be given here to illustrate the meaning and significance of these categories. Statements such as

acceptance of the value of freedom and democracy,
belief in the equality of man and compassion for fellow humans,
acceptance of social responsibility, and
tolerance and understanding of differences,

are clearly examples of category a. They invariably express features in an individual which are deemed to be desirable in his interaction with others and as a member of a particular community or society.

352. Examples of characteristics falling within category b. are:-

enjoyment in using all the senses for exploring and discriminating;
development of lasting interest;
responding to challenges which require physical skill and mental alertness and through this confidence is gained leading to satisfaction, self-respect and poise;
development of the ability to organise work and to study independently to a given date for the completion of work;
showing perseverance in activities started.

It is of interest to note that at least some of these statements express what may be described as aspects of personality, or personality traits. Indeed, statements expressing personality characteristics are not uncommon in broad enunciations of curricular intentions, but the question must be raised (and is discussed below) whether such characteristics form part of what can legitimately be assessed in students.

353. Statements falling within the third category usually express characteristics which are thought to be desirable or worthwhile in relation to particular subject areas and the activities arising in connection with them. For example, in the context of practical work in science, the following affective qualities have been suggested:-

development of satisfactory attitudes to safety regulations;
display of honesty and integrity in the reporting of observations and data;
development of the ability to work in groups or as a member of a team;
exercise of care in the execution of laboratory tasks.

Subject- or discipline-related affective characteristics also arise in non-science disciplines. For example, the awareness of "aesthetic qualities" features as a desirable characteristic in the context of art, craft and design work, and a general type c. affective characteristic would be "concern shown by the student about the cultural value" of a particular subject or group of subjects.

354. The separation of affective characteristics from those concerned with cognition and skills, which has been made here, is primarily a matter of convenience. It should not be interpreted as implying a rigid division of affective qualities from cognitive abilities and/or psychomotor skills. On the contrary, a distinct link usually exists between these. For example, in the exercise of aesthetic judgments about pieces of art work or designs, values and standards are bound to be invoked which are based on cognitive criteria. Likewise, advocacy of and

adherence to certain safety standards in laboratory work or other practical activities is bound to have its origin in an understanding of the principles of safety procedure. Similarly, acceptance or rejection, as the case may be, of certain values and attitudes stems frequently from an appraisal and evaluation of arguments and counter-arguments rooted in cognitive foundations, not merely emotional ones.

355. In most instances, the exception being those instances which relate to behaviours directed by primary drives, affective characteristics overlap with cognitive and psychomotor ones. In the same way, cognitive characteristics, when they are displayed by students, generally contain affective elements of behaviour, such as preparedness and willingness to engage in the cognitive activity. In passing, this comment may be widened to the actual activity of teaching: it is in principle not possible for a teacher or lecturer to limit himself in his teaching to purely cognitive objectives; he must, in presenting materials or information, inevitably display affective characteristics, such as values, prejudices, biases and preferences.

The Assessability of Affective Characteristics

356. The term *assessability* is used here with two notions in mind. The *first* of these concerns the technical issues involved in the assessment of affective qualities. One aspect of this is the translation of global statements about affective qualities into operationally meaningful criteria which can be assessed more or less objectively and from which the presence or absence of certain affective qualities may be inferred. The importance of this translation cannot be over-emphasised. Many, if not most statements made in curriculum programmes about affective qualities to be generated in the learner, lack operational meaningfulness. How is one to interpret, for example, terms such as "sensitivity towards other people," or "critical attitude of mind" or "concern for the environment"?

357. Basically, affective qualities such as these remain unassessable unless they are so elaborated that criteria are evolved which allow judgments to be made as to whether or not a person displays a particular affective quality. Without a translation into operationally meaningful criteria, affective qualities stated loosely as part of a set of curriculum intentions cannot be assessed, and often serve no function other than that of "window-dressing". Thus, Matthews (24), in commenting on this very issue of translating general aims into specific, discernable behaviours, not only points to the potential usefulness for this purpose of Krathwohl (25) but also gives an interesting example of one such translation exercise.

358. The *second* notion of the assessability of affective characteristics is not concerned with a technical issue but an ethical one. As has been indicated, many statements expressing affective characteristics on the part of the learner point towards qualities which lie within or are close to the personality and character sphere of human traits. To what extent, if at all, can the assessment of these qualities form a legitimate part of the assessment of students' affective characteristics? For example, should working habits and preferences (eg. whether an individual prefers to work individually or in a group) be the focus of assessment by teachers? Should moral values and attitudes be the subject of assessment?

359. There is no ready-made answer to this kind of question. One may pursue the issue further by raising the question whether one can, in fact, establish a clear correspondence and relationship between affective characteristics as they may be apparent in students and curriculum influences. In many instances, it would appear from numerous researches, this correspondence is weak and dubious: little, if any, causal relationship would seem to exist between students values and attitudes and the *formal* educational influences to which they were exposed. This should not be too surprising for two reasons: first, our knowledge about how attitudinal and value changes may be brought about is still scant; second, very few instructional practices are oriented towards affective goals and so no deliberate attempt at teaching values is made.

360. If it is accepted that many attitudes and values as they develop in the learner, cannot be directly attributed to curriculum influences, any suggestion

that such qualities should be assessed must be a questionable proposition. Nevertheless, we may perhaps suggest that the assessment of affective characteristics of students is justified in two instances:-

i. when these characteristics may be attributable directly to curriculum influences. In many cases, affective characteristics falling within the third area described above, qualify for inclusion as "assessable" qualities, mainly by virtue that they incorporate substantial cognitive elements;
ii. where the affective characteristic relates directly to or has a significant influence on the way and manner in which a student performs, in an academic task or assignment, and where the success in the task may be dependent on the characteristic.

361. The assessment of certain attitudes relating to practical work in the sciences may be justified in terms of both the above criteria. Likewise, "being concerned for the application of scientific knowledge within the community" (Schools Council Integrated Science project) is a quality which involves a substantial knowledge element about the powers and potentialities of science and about the needs of society and would thus qualify under (i) for incorporation into a scheme of assessment. Another quality specified by the same project is "perseverence in designing and performance of simple experiments" and may be considered a "legitimate" quality under (ii).

Techniques for the Assessment of Affective Characteristics

362. In principle, affective characteristics may be assessed by three main techniques, or a combination thereof. These techniques are:-

a. interviews either "open-ended" or "structured", between students and assessor, in formal or informal settings;
b. written tests and inventories, used largely for attitude measurements;
c. direct observation of students in a situation demanding the display of affective characteristics.

363. A detailed appraisal of these techniques is beyond the scope of this discussion. However, some of the major advantages and disadvantages associated with each technique may briefly be summarised.

Open-ended interviews usually require an informal setting and allow a wide range of attitudes, likes and dislikes, prejudices and values to be explored without confinement to a predetermined set of questions. Insofar as the interviewer and respondent interact in a "free response" setting, the assessment made is likely to be strongly subjective and of limited reliability. Open-ended interviews are best used for exploratory and diagnostic purposes only and not for formal assessments.

Structured interviews are those in which a predetermined set of questions is used and where the interviewer attempts to evaluate as objectively as possible the student's responses to the questions. In the majority of cases, a structured interview offers little advantage over the use of inventories or questionnaires except that follow-up questions may be asked and ambiguities and misunderstandings corrected *in situ*. Interviews are generally time-consuming to conduct, even when organised as group interviews.

Written tests cover a wide variety, from simple questionnaires and attitude surveys to sophisticated attitude and value inventories. Good (ie. valid and reliable tests and inventories) are difficult to construct and require developmental procedures not unlike those used for multiple-choice tests.

In terms of their content and structure, written tests resemble the structured interview, but are more convenient for large-scale administration. One disadvantage associated with written inventories (and also to a lesser extent, interviews) is that the respondent can produce or select answers which may or may not correspond to his real attitudes. For example, the student may *claim* to have particular likes or dislikes simply because he judges them to be desirable in the assessor's view. Thus, the respondent's answers are coloured by how he interprets the purpose of an attitude questionnaire. The danger of this falsification is particularly

pronounced in the case of simple unsophisticated tests.

Direct observation: actual manifestations of attitudes and other affective characteristics present themselves only in the form of particular behaviours and actions which a student displays. Therefore, direct observation of students must be considered to be an important method for the assessment of affective qualities. Students' day-to-day classroom behaviour offers a particularly useful scope for attitude assessments by means of teacher observation.

An actual assessment of affective characteristics by by direct observation is not straightforward, for two main reasons:-

i) assessments so made are likely to be highly subjective and may be unreliable, unless clearly defined assessment criteria are available to which the teacher can refer. The identification of such criteria, however, poses more problems than does the specification of assessment criteria for other areas;

ii) teachers may not always be willing to assume the role of assessing qualities which they judge to be outside their professional competence and responsibility; they may be reluctant to enter into judgments of "non-academic" qualities.

364. In practice, formal methods of assessing affective characteristics (structured interviews, written tests, etc.) are used only in the context of curriculum evaluation and research, for example, in order to establish the effects and effectiveness of an educational intervention. For the purpose of establishing the affective qualities of individual students, informal methods are generally preferred and have been advocated for internally-conducted assessments. The opportunity for conducting informal assessment of affective characteristics arises in a wide variety of educational situations, for example:-

i) during informal, seemingly casual discussions with students, in classrooms, laboratories, workshops, etc.;

ii) in the course of the supervision of students' work in laboratories where work-habits, awareness of safety regulations, etc., can be assessed by observation. (This type of assessment could also take place outside the classroom and could involve individuals other than teachers, as in the Design and Craft Education project.);

iii) in the context of group discussions or simulation/gaming exercises, where interpersonal skills, open-mindedness and other qualities are likely to become evident.

Review and Critique of Assessment Procedures in Use

365. Despite the fact that in curriculum statements and syllabus introductions much emphasis is given to the importance of developing in the learner a wide range of affective characteristics (usually of the attitudinal kind), relatively few examples came to light in the course of our analysis of genuine attempts to measure and assess the achievement of these characteristics.

366. One may ask why this should be so, why in most cases is the emphasis given to affective characteristics not paralleled by a similar emphasis on the assessment of these characteristics. The following quotations from actual curriculum projects reveal some of the views taken by curriculum developers:-

i. "... attitudes, interest, feelings, etc. cannot be measured in the time span available at school" (Design and Craft Education project);

ii. "attitudes change overnight" and "there is a difference between a *public* attitude and a *private* attitude and a publicly accepted *right* attitude could be produced for purposes of examination" (Design and Craft Education project);

iii. "to measure accurately change in pupils' attitudes .... requires sophisticated techniques" (Geography 14-16 project);

iv. "the most important values derived from a study of history may well be unexaminable under any system" (History 13-16 project).

367. Comments like these point clearly to the problems of the assessability of affective characteristics, chiefly on the grounds that adequate measuring/assessment procedures are not available. In other words, the *technical* problems of assessment are recognised, and one may assume the views expressed in the above quotes would find widespread endorsement by other curriculum developers also. Interestingly though, the issue concerning the "legitimacy" of assessing certain affective characteristics has not been raised at all, except perhaps by implication by the designers of the Open University course "Making Sense of Society" who state that "attitudes are your own affair".

Criteria for Assessment

368. A general problem concerning the assessability of attitudes and similar characteristics seen by curriculum developers as hoped-for affective outcomes is the inadequate operationalisation of the statements expressing these characteristics. Even in situations where an operationalisation of affective qualities has been attempted, the outcome has not produced sets of criteria on the basis of which the affective characteristics can be assessed. For example, the experimental CSE examination based on the Schools Council Design and Craft Education project, suggested the assessment of, *inter alia,* the following:-

span of concentration;
ability to organise work;
ability to study independently;
ability to work as a member of a team;
recognition of needs of others;
tolerance and understanding of differences;
questioning attitude to given opinion/statement.

369. Few, if any, of the above qualities can be adequately assessed in the absence of detailed criteria against which judgments can be made. Yet, the information issued to teachers using the Design and Craft Education materials suggests that they conduct "informal" assessments, based on their own subjectivity, of these "attitudes, orientations, social interactions skills and aesthetic qualities" and that, when making these assessments, teachers be guided by their own observation of students' day-to-day classroom behaviour. It must be a matter of considerable doubt whether teachers can arrive at reliable and fair assessments of their students, given the scant guidelines and criteria.

370. Even the Schools Council Science 5-13 project, which otherwise exercises a strict adherence to the Objectives Model of curriculum development, fails to translate its affective goals/aims into terms and criteria which could be of value in the assessment of these goals. For example, it advocates the development in the learner of, *inter alia*:-

"sensitivity to the need for giving proper care to living things";
"enjoyment in using all the senses for exploring and stimulations";
"interest in choosing suitable means of expressing results and observations".

Again, one must ask what the behavioural manifestations of "sensitivity", "enjoyment" and "interest" are which allow these qualities to be assessed.

371. On the other hand, the following statements, taken from the science component of the North West Regional Curriculum Development project, have a significantly higher degree of operationality and are thus more acceptable, at least in principle:-

(the ability to work) "in small groups, accepting one of the group's readings towards a final result";
(the ability to record) "observations for another group whose work depends upon the readings".

In fact, both these statements express in near-behavioural terms features deemed to be desirable in students' relationships with other students, but they do so entirely in relation to the exercise of cognitive skills in the context of scientific work. Thus, these affective objectives may be classified as type c (para. 350) objectives whose inclusion in a spectrum of assessed qualities was thought to be justifiable.

372. A general impression that emerges from the analysis of statements expressing affective qualities to be fostered by curricula, is that the more "subject-related" such statements are, the easier is their translation into terms which express some overt, and hence measurable, manifestation of the affective

quality. Just as in the case of cognitive abilities or pyschomotor skills, the measurability of an affective characteristic is, of course, not established merely through the specification of an overt behavioural characteristic of the quality under consideration, but requires, in addition, operationally meaningful assessment criteria to be specified. The purpose of such assessment criteria is to facilitate the ranking or grading of the extent to which students display the desired characteristic.

373. An example of a set of assessment criteria specified for an affective quality is that recommended by the London GCE Board in connection with its scheme of teacher-based assessment of practical work in A level chemistry. Included in the list of qualities to be assessed are "students' attitudes towards practical work", for the assessment of which a five-point rating scale is to be applied around the following fixed points:-

5: interested, eager and curious, enthusiastic, self-reliant and resourceful;

3: moderately active in class and quite interested – gets on well with what he is told to do but is not especially resourceful – persistent – needs his interest to be stimulated;

1: not interested at all – careless and unenthusiastic – passive in response – lacking in concentration – lackadaisical and diffident towards the subject.

Similar rating scales have been recommended by other GCE Boards and also by certain curriculum developers, for example the Schools Council Integrated Science project team.

374. Even when rating scales like the above are produced as tools for the assessment of affective characteristics, their actual application must of necessity still lead to subjective judgments for the decision as to what constitutes "moderately active in class", for example, rer:ains in the ultimate analysis a matter of personal judgment and opinion. However, some modicum of agreement would normally be expected between experienced teachers, and so the assessment of affective characteristics comes within the scope of reasonable possibility.

The Assessment of Affective Characteristics in Practice

375. As already pointed out, very few examples exist of genuine attempts at attitude assessment. The majority of projects do not attempt to measure students' attitudes or other affective characteristics and confine themselves to the assessment of students' cognitive and, where appropriate, psychomotor abilities and skills.

376. Where mention has been made of the assessment of affective characteristics, it has usually been in association with recommendations for internal (teacher-based) assessment or in connection with projects which do not lead in any case to certification. As previously indicated, the Design and Craft Education project encourages the teacher to assess, on the strength of his/her "subjective observation of students' day-to-day classroom behaviour", "span of concentration", "tolerance and understanding of differences" and "expectance and adaptability to change", but provides few real guidelines about how to conduct the assessment.

377. The Geography for the Young School Leaver project takes the view that "the areas of values and attitudes ..... are closely linked with intellectual objectives and are, therefore, difficult to isolate .....". Against this background, the project accepts that it is possible to construct test questions which, whilst drawing on the students' intellectual skills and knowledge, also raise issues involving personal viewpoints. However, in an additional statement, the project developers argue that although this type of question "may provide useful evidence of attitudes or sensitivies ..... marks are awarded for the pupil's ability to justify his opinions rather than for any particular view he holds". Marks are, therefore, awarded for cognitive abilities rather than affective characteristics.
Examples of questions which test students' knowledge as well as their attitudes to certain issues, are as follows:-

Question 1:
Imagine that a decision was made to make the Anchor Steelworks a privately owned company

rather than part of a nationalised industry.

a) Do you think that this would be a wise decision?

b) Give two reasons for your opinion.

Question 2:

a) Do you think that people should be allowed to live very near to factories?

b) Give two reasons for your answer.

378. A similar approach to the assessment of affective characteristics is recommended in "A New Look at History", the Teachers Handbook of the Schools Council History 13-16 project. It is suggested that at CSE (Mode 1) level the "enquiry in depth" should include one question which "will provide the students with the opportunity to demonstrate empathy". In one specimen paper set for the "enquiry in depth" section, an extract of prose describing the Sand Creek Massacre of 1864 is followed by a number of questions, the last of which appears to be the one assessing empathy: "Imagine you are Colonel Chivington describing the incident in the extract above in a report to his superior in Washington" and up to 20 lines are provided for the candidate's answer. However, the total paper, which contributes 10% of the final assessment, contains 5 questions and so it is apparent that only a very small proportion of the marks is in fact awarded to the candidates' display of empathy, despite the considerable emphasis put on its desirability in the Handbook.

379. The Schools Council Integrated Science project, as has already been discussed, has identified a number of objectives involving affective characteristics which are internally assessed by the teacher. Guidelines relating to the conduct of this assessment and the awarding of marks are issued by the Associated Examining Board. The assessment is based on written evidence from the students (eg. essays on social issues), teacher observation (eg. in the assessment of "perseverence", "being able to work individually and as part of a group") and class discussion (eg. in the assessment of "being concerned for the application of scientific knowledge within the community"). The teacher keeps a careful record of his marks and observations throughout the three years of the course and combines them at the end of the period to make up the 20% awarded by internal assessment.

380. The analysis has shown the high degree of uncertainty which exists about the assessment of affective characteristics. Almost all curriculum projects put considerable emphasis on the acquisition by the student of affective characteristics but the rhetoric is rarely followed through into attempts to assess such characteristics. Clearly curriculum developers who produce elaborate and attractive sounding statements of this kind (usually in an introductory chapter of the Teachers Handbook entitled "Aims, goals and objectives") but fail to make further mention of them elsewhere, can justifiably be accused of "window-dressing".

381. If the question of assessing affective characteristics *is* raised by curriculum planners, it is answered in one of two ways. It is either dismissed for the reasons outlined earlier ("lack of suitable instruments", "not desirable" and so on) or some attempt is made to assess by using internally-organised, teacher-based techniques, usually involving observation, written work (essays, test questions) or some form of oral work. The two main difficulties with such procedures are, however, those relating to objectivity and those relating to the close relationship between the affective and the cognitive domains. On the issue of objectivity, it was seen that even careful attempts at providing detailed criteria for the award of the grade ran into problems of interpretation for many of the terms used in the statement of the criteria themselves ideally need further definition. Without these definitions, the teacher is thrown back on to reliance on his own personally held standards and values. The other issue, that of the relationship between the affective and the cognitive domains, poses difficulties of a different kind. Where the affective statement has a cognitive component, assessment is facilitated because the resulting student behaviour becomes measurable. However, the affective component in this situation inevitably becomes a means whereby the cognitive component is realised ("showing perseverence in solving a problem") and so loses its assessability.

382. It seems, therefore, that the reluctance shown in relation to the assessment of affective characteristics derives from the two sources of difficulty indicated

earlier – those relating to the advisability of assessment in the face of ethical arguments and those relating to the technical difficulties. It is hoped that the classification put forward will enable curriculum planners to make decisions about the types of affective characteristics they can "legitimately" assess and that the assessment procedures described in relation to selected curriculum projects will enable them to weigh up the suitability, or otherwise, of the various techniques for their own curriculum purposes.

The Assessment of Psychomotor Skills

383. We use the term "psychomotor skills" mainly to refer to those outcomes of educational programmes and curricula which concern the acquisition of practical and manipulative skills. Particular areas of study where the acquisition of these types of skill is of major importance are the sciences and technology, and the art and craft subjects. In a wider context, the term "psychomotor skill", can also be applicable to areas such as the dramatic arts and physical education in which the training of the expressive and physical powers of the human body is of key importance. However, these areas are not considered in the present analysis.

384. In discussing the assessment of practical and manipulative skills, we shall limit ourselves to those areas and levels of education where the acquisition of these skills is an educational goal in its own right. Situations where the acquisition of skills merely serves as a means of facilitating particular teaching approaches, or for the purpose of developing particular cognitive/intellectural outcomes, are thus outside the scope of this analysis. For example, a laboratory-based approach to O level physics will of necessity develop a range of practical skills in pupils; these, however, are not usually assessed in the relevant examinations.

Types of Practical Skill to be Assessed

385. Relatively few of the curricula analysed (see Appendix 1) make specific reference to psychomotor skills in the list of educational outcomes to result from them. Those that do include the following:-

i. the Nuffield O and A level science (Biology, Chemistry, Physics) projects and, at A level only, Physical Science.
ii. several other science projects not covered by i. (eg. Nuffield Secondary Science, the Schools Council Integrated Science project, and the JMB Engineering Science programme at A level which was derived from the Project Technology activities);
iii. the Schools Council Design and Craft Education project and the examination syllabuses based on it;
iv. the History, Geography and Social Science 8-13 project (Time, Place and Society) sponsored by the Schools Council.*

386. Although the actual nature of the practical skills listed by these projects or curricula varies from subject area to subject area, a broad categorisation of these skills is possible. Three major categories emerge:-

a. skills directly concerned with the manipulation and use of equipment in the execution of practical tasks;
b. skills directly associated with practical work (eg. observations and measuring, the recording of experimental results);
c. abilities which are integral to most practical activities but are not "psychomotor" in nature. These include the design of experimental investigations (in science) or of pieces of art or craft work, the interpretation of observations and data from investigations, etc. These abilities are generally cognitive in nature involving the student in the exercise of intellectual powers and, sometimes, aesthetic judgment also. But, since they arise in the context of practical situations, it has become customary not to separate them from this context in any assessment.

387. There now follows a review of procedures for the assessment of practical and manipulative skills in

* It is, however, important to note that the references to psychomotor skills in this project are not compatible with our concept of the psychomotor skills, as the skills enumerated (map-reading, collecting evidence, etc) are means to cognitive ends, rather than manipulative ends in themselves.

current use for different subject areas, together with an analysis of advantages and disadvantages associated with them.

The Assessment of Practical Skills in the Science Area

388. The traditional means of assessing practical competences in the science area has been the formal "practical examination". In practical examinations, students are normally required to carry out prespecified tasks, usually under highly standardised conditions in relation to, for example, the equipment and materials provided and the time allowed for the completion of the tasks. Observations and measurements made during the execution of the practical tests generally require to be recorded by the examinee and this record forms the basis of the assessment of the student's practical skills.

389. Whilst most GCE Boards still include formal practical examinations as a component of the A level examinations in science, in addition they now offer teacher-based internal assessments as an alternative. Similarly, formal practical examinations which were at one time the normal practice within both further and higher education have, in most instances, been replaced by less formal methods which are often based upon continuous assessment techniques or on series of small-scale practical tests conducted at various stages of an educational programme.

390. There are several reasons for the "swing away" from formal practical examinations which relate, in the main, to their validity and reliability as measures of students' practical abilities. These are that:-

i. practical examinations, externally conducted, tend to make use of tasks which are easy to administer and assess. These tasks and investigation involving them are often not characteristic of the skills and practical abilities which the courses seek to instil in students;

ii. ease of marking to comparable standards usually demands that the quality of a students' practical work is judged by the outcomes or result of such work (eg. the accuracy of a measurement or the correctness of an observation). There is no *a priori* reason to assume that the outcome of practical operation is necessarily an indication of the quality of the operation itself. This issue has been fully discussed by Kempa (26);

iii. practical examinations are "one-shot" affairs and hence, subject to the inaccuracies and unreliabilities usually associated with single measurements. Continuous assessment techniques allow multiple measurements of practical skills to be undertaken.

391. A further argument against the adherence to formal practical examinations, at least in the context of public examinations, is their effect on the nature and range of practical work undertaken in the relevant courses. As reported by Kerr (27) as long ago as 1964, the existence of separate practical examinations in school science courses led teachers not to integrate laboratory work and theory work in science teaching and resulted instead in an excessive emphasis on the training of students in those skill areas which were strongly represented in the practical science examinations. It is worth noting that the adoption of continuous assessment techniques has had a distinct, positive effect on the nature and range of practical work now done in the context of A level science courses.

Assessment Criteria

392. Most of the overt statements about the qualities to be covered in the assessment of practical work have come from the GCE Boards. In general, four broad areas are recommended for assessment:-

a. manipulative skills and competences;
b. skill in observation and the accurate recording of observations;
c. ability to interpret observations;
d. ability to devise and plan experiments.

In addition attitudes to practical work have been suggested as a fifth area of assessment.

393. The four assessment areas a. to d. reflect basically the major ingredients of practical work in the sciences. Detailed information and suggestions about the conduct of assessments of practical work

in A level science courses are available, for example, from the University of London School Examinations Department and the Joint Matriculation Board Examinations Council. (See also reference 28.)

394. The *Engineering Science* area merits special attention since it involves the assessment of both course work and a project, as is the case of the JMB Engineering Science A level scheme (which is based on the proposals of Project Technology) and the London A level Engineering Science course:-

395. The assessment procedures for ordinary investigations in Engineering Science are in principle similar to those described for the science area and relate to, *inter alia*:-

i. competence in the use of instruments;
ii. selection of equipment to enable observations to be made;
iii. selection of working procedures;
iv. identification of observables and the making of observations;
v. processing of observations and formulation of conclusions.

396. The assessment of a student project cannot concentrate merely on selected aspects of the work involved but requires a 'holistic' approach to be taken in which *all* major facets of the student's activity receive attention. This inevitably means that psychomotor aspects cannot be assessed in isolation from cognitive and affective characteristics.

a. *Components of project work*

The London GCE Board suggests the following activities as major components for project work:-

i. identification of a problem or need;
ii. analysis of the general problem statement into practical terms; specification in detail;
iii. consideration of information from books, periodicals and people;
iv. suggestions of solutions, identification of likely difficulties and selection of the preferred solution;
v. planning of a course of action;
vi. detailed design;
vii. realisation of the design;
viii. the testing, possible modification and assessment of the final solution against the original specification;
ix. appraisal of the project.

b. *Assessment criteria*

For the assessment of Engineering Science projects, the London Board suggests as assessment criteria:-

i. origination of the project;
ii. project specification;
iii. planning the project;
iv. consideration of alternatives;
v. originality;
vi. use of resources;
vii. appraisal of the outcome of the project;
viii. assessment of the conduct of the project.

In operational terms, these assessment criteria may not be directly helpful to an assessor unless they are further refined and broken down into "observable" characteristics. They do, however, identify the different facets in a student's performance that merit consideration.

The JMB's assessment scheme suggests a series of explicit assessment criteria which appear to be of value not only for Engineering Science projects but also, with minor modifications, for project work in other fields. These are:-

Criteria with respect to the project

Planning

In planning the project the candidate ...

recognised relevant factors, discussed their importance sensibly, drew up a detailed specification in practical terms and mapped out a reasoned plan of campaign; 3

as above but lacked one significant feature; 2

made some attempt to analyse the problem in practical terms; 1

made little attempt to analyse the problem. 0

Execution

In executing the plan the candidate ...

gave thorough consideration to realistic alternatives at every stage, and made a reasoned selection of the optimum solution in each case; 3

gave consideration to realistic alternatives with inadequate reasons for selection; 2

gave some attention to the consideration of alternative solutions; 1
paid little attention to this aspect of the work. 0

Design activity

In relation to the design for all or part of the project with respect to procedure or artefact the candidate produced ....

a markedly significant and original contribution; 3
an original contribution; 2
a new device by applying a standard design technique; 1
little nor no design activity during his work on the project. 0

Use of resources

In relation to the resources and time available the candidate ....

used them well throughout the project; 3
used them reasonably well for much of the project; 2
failed to make reasonable use of them over significant periods of the project; 1
made little use of them throughout the project; 0

Critical review

In comparing the final product or outcome with the original specifications the candidate has produced ....

a thorough and objective discussion in which consideration has been given to all major aspects of the work including suggestions for further development and a critical appraisal of the conduct of the project with a clear indication of the lessons learnt; 3
a reasonable depth of discussion which, however, lacks either objectivity or coverage; 2
some significant comparison; 1
a discussion of little significance. 0

Personal contribution

In planning, executing and appraising the project the candidate ....

exercised initiative and judgment throughout; 3
lacked initiative and judgment at times; 2
made little personal contribution; 1
relied entirely on external help. 0

397. Apart from the science area, the broad curriculum field comprising the crafts, design studies and technology is the one mostly closely associated with the development of skills and practical competences. This field is a further one to be considered in an analysis of modes of assessing practical skills.

398. Of major influence on the identification of skills-related objectives for craft and design courses as are now offered by many GCE and CSE Boards has been the Schools Council sponsored Design and Craft Education project. The Schools Council Working Paper No. 26 (entitled "Education through the use of materials") makes explicit the main goals of the Design and Craft Education project in the "motor skills" area, viz:-

i. direct manipulation (without tools) of materials such as clay;
ii. manipulation of materials through use of hand tools (tools for which all power is provided by the operator);
iii. manipulation of materials through powered hand tools (tools driven by energy from a source external to operator but which are guided by the operator).
iv. manipulation of materials by machine tools.

No elaboration of these goals is provided in the Working Paper in terms of the actual range of tools (and materials) which the student is to experience, but such elaboration is given in a number of O and A level GCE and CSE syllabuses for Metalwork and Woodwork courses (eg. General Certification of Education Regulations and Syllabuses, Joint Matriculation Board, Manchester).

399. It is found in the context of GCE, for example, that where the craft element is strong and where the development of manipulative skills features as an important educational goal in its own right, practical examinations are still adhered to. Thus, the JMB includes practical examinations in its Woodwork and Metalwork examinations at both O and A level and does not at present allow continuous assessments to replace completely these practical examinations at A

level. This is in contrast to the sciences where teacher-based continuous assessment of practical abilities is now an established alternative to the traditional formal practical examination.

400. In all cases of practical examinations in the "Technical Subjects" domain, the criteria employed in the assessments relate to two major facets: a candidate's *ability to design*, and the skills needed for *realising designs*. In a strict sense, only the latter can be said to involve genuine psychomotor skills along the lines of the above classification. Nevertheless, the inclusion of the former under the heading "practical abilities" is justified insofar as design is an integral part of an overall creative process. This is analogous to the situation in the sciences where "practical abilities" are taken to include actual practical skills and also those intellectual abilities which relate directly to the execution of practical tasks.

401. In general, the assessment of motor skills in the crafts area is based on the inspection of pieces of work made by the candidate. The main criterion would appear the extent to which such pieces of work reflect "craft standards". Thus, the assessment focuses on the *outcomes*, the products, of the student's workshop activity, rather than on the actual manner and expertise with which he handles tools and machinery. Studies of assessment procedures in the sciences suggest that the quality of the product of a complex manipulation cannot always be taken as an indicator of the quality of the manipulation itself as seen in the skill and dexterity with which equipment is used or tasks sequenced. One may raise the question whether this problem also applies to the craft/design area.

402. Assuming that there is no absolute correspondence between the results of assessments based on the outcomes and products of practical work and those derived from the scrutiny of the working processes themselves, it must remain largely a matter of personal judgment as to which of the two criterion bases for assessment is preferred. It might well be argued that at least in the initial phases of a student's education and training in craft and related subjects, the acquisition of sound, efficient and safe working habits must be an educational concern of the highest priority and that the quality of the products resulting from the student's work may have to be attributed a lower priority rating. If so, "process-related" assessment procedures would have to be advocated, which means that manipulative skills should be assessed by direct observation of the student at work. Only at a later stage in the student's education and training, when his skill performance has reached a sufficiently high and safe level, would a shift in emphasis towards "outcome-related" assessment criteria be warranted.

403. Experience of assessing practical work in areas other than the crafts and related technical subjects indicates strongly that process-related assessment techniques lack reliability and consistency unless they involve the use of clearly defined performance criteria with reference to which a student's practical performance can be gauged. Scrutiny of assessment and examination schemes for the craft subjects did not reveal the existence of any detailed lists or summaries of such performance criteria. We see the development of sets of performance criteria to be an integral part of the development of any assessment techniques that focus on the processes of practical work rather than its outcomes, and would want to encourage development in this direction for both general and vocational courses in Further Education institutions and elsewhere.

Communicating Assessment Results – Towards Student Profiles

404. Traditionally the results of examinations and assessment in most subjects have been communicated in the form of single grades or degree classes. In recent years this practice has increasingly been challenged, mainly because single grades or degree classes alone provide little information about the qualities that are reflected in them. Consequently, other modes of communicating assessment results are being advocated. Foremost amongst these is the use of multidimensional reporting of such results, in the form of "profiles". Two types of information can be conveyed in such profiles: one concerns a student's academic performance in a course; the other a student's personal characteristics. The latter type of information, however, is often thought not appropriate

for inclusion in profile unless it relates to or has a bearing upon students' academic performance and/or potential.

405. Until recently relatively little attention has been paid by curriculum developers, as well as examiners and examination boards, to profile reporting of assessment and examination results. Indeed, it is in the FE sector that substantial interest has recently been shown in profile assessment, especially in the context of vocational preparation schemes (29). Nevertheless, one can point to a growing amount of literature on student profiles. One substantial book on the subject is *Pupils in Profile* (30) which describes the recommendations by the Head Teachers' Association of Scotland that "every pupil who has completed a course of secondary education up to 16 be offered a documentary record to that effect", and also presents an account of a developmental project undertaken by the Scottish Council for Research in Education on a profile assessment system.

406. In England, a system based on the idea of a personally compiled pupil record which seeks to provide a record of achievements, selective experiences, interests, talents and aspirations when pupils leave school, was developed by the Swindon Borough Education Authority. The profile, which is referred to as the Record of Personal Achievement (RPA), was independently evaluated under Schools Council sponsorship. The evaluation report (31) outlines the extent of the RPA use, how the scheme operates in the schools, and also considers its use as a leaving qualification. Whilst emphasising the potential of RPA, the evaluation study is also realistic in identifying the need for improvements "in terms of curriculum support, teacher and tutor training and in the materials themselves". Secondly, we have the more restricted School Leaver's Attainment Profile of Numerical Skills (SLAPONS) which emanated from the Mathematics in Education and Industry project based at the Shell Centre for Mathematical Education, University of Nottingham (32). The purpose of this particular scheme is to provide employers interviewing 16+ school leavers with detailed information about their achievement in numerical skills.

407. A number of Welsh schools has also been developing "profile reports" or "leaving certificates" and the WJEC and the Schools Council (Wales) are currently involved in a feasibility study the purpose of which is to develop a national profiling scheme.

408. There now appears to be a growing acceptance of the fact that some form of standardised profile should be developed to provide a detailed account of how a pupil has performed during his final two years at school including examination results. However, it is also clear that there is still a great deal of work to be done if a system is ever to work properly. Whilst the latest Schools Council Report on the subject (31) draws attention to the need for adequate resources to enable teachers to be trained in the making of assessments, it also warns that the "effectiveness of a profile report as a qualification will be undermined while the public examination system at 16+ continues."

409. The development of profiles is not, however, just the prerogative of the secondary sector. Details of publications dealing with developments within Higher Education are given in reference 33.

Conclusions

410. Early in this chapter, a distinction was made between evaluation and assessment to dispel some of the confusion which currently surrounds the terms. Such confusion is evidenced by the often similar or interchangeable meanings attributed to them or, in cases where separate definitions are attempted, by a lack of concern to show the relationship which exists between them. It was, therefore, noted that whilst evaluation and assessment can each serve a number of functions, the predominant function of evaluation is that it addresses itself to the "appraisal of a total situation", whereas assessment (including examinations) relates to the appraisal of students' achievement resulting from their exposure to an educational experience.

411. The main focus in this chapter has been on assessment and examination procedures because these frequently constitute a major component of many curriculum evaluation attempts and also

because recent curriculum development projects have in many instances, led to a reappraisal of such procedures. It is recognised, of course, that the development of novel assessment procedures is in itself not part of curriculum innovation *per se*; nevertheless it is sufficiently closely linked to it to justify discussion and analysis in this Report.

412. Experience gained from many curriculum development projects in the secondary sector points toward the problematic relationship between curriculum innovation and examinations, especially those forming part of the established range of "public examinations". Although the principle is widely accepted that examinations should follow and not determine the curriculum, in practice it is found that curriculum innovation is unlikely to succeed unless it is endorsed by the establishment of appropriate examinations. What is desirable, therefore, is that concurrently with the development of courses or curricula, there should take place the development of examinations and assessment methods which are supportive of the aims of such courses or curricula.

413. The achievement of a high degree of compatibility between curricula and examinations has been a major objective of curriculum developers throughout the recent history of curriculum development work. Waring has described the efforts in this respect by the early Nuffield Science projects (34). More recently, the Schools Council Geography 14-18 project gave priority to restructuring their examination so that teachers would see it as reflecting and indeed consolidating curriculum change rather than impeding it.

414. One may, of course, question whether it should be "legitimate" for curriculum developers to influence and tinker with the examination system. The history of curriculum development work, however, points strongly to one fact: unless there is congruence between as project's educational intentions and assessment procedures, the project's success is endangered. Thus, in the interest of educational development work, close working relationships between developers and examining boards would seem highly desirable.

415. Our analysis of developments in the field of examinations and assessment procedures shows that so far the main thrust of development work has been in relation to the testing and measurement of cognitive skills. In practice, this has resulted in the widespread adoption of "mixed" assessment methods, embracing various forms of objective assessment procedures and combining them with more traditional techniques, such as essay-type examinations. By and large, these developments have been in the area of written examinations only.

416. Some measure of development work can also be reported for the assessment of psychomotor skills, especially in relation to practical abilities in science. By contrast, the assessment of students' affective characteristics is still a grossly neglected area, despite the considerable emphasis placed by curriculum developers on such characteristics in their statements of curriculum intent. It is in this latter area that much further detailed development work is needed so that reliable assessment schemes based on workable criteria may emerge.

417. With this is mind, we have proposed for the area of affective characteristics, a three-fold categorisation scheme (see para 350) which enables the curriculum implementor to differentiate between the various types of characteristics referred to in statements of curricular intent. It is hoped that this will facilitate informed decisions to be made about the purpose of assessment and the appropriateness of different assessment strategies and techniques. It is also hoped that the categorisation scheme will serve to overcome some of the technical difficulties involved in the assessment of affective characteristics and lead to an increased awareness of the ethical questions inherent in such assessments. In particular, the intention has been to raise the level of scepticism in respect of the non-operationality of some of the statements contained in curriculum developers' rhetoric and to warn future developers against making statements which cannot meaningfully be translated into overt behaviour patterns and, therefore, be assessed.

418. Finally, it must be pointed out that the need for certification imposes constraints on the curriculum

developer which need to be taken into account from the outset of planning. Not only is there need to identify the relationship between intentions and outcomes, but in addition thought needs to be given to the eventual demands in terms of expertise, the availability of resources and the time needed to carry out the required assessment procedures in situations where teacher-based assessment is required. It should be recognised that many of the newer assessment modes and procedures create new pressures for teachers and that opportunities need to be created for teachers to gain practice in the necessary skills and to come to terms with the changed nature of teacher-student relationships which these changes imply.

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Chapter 7 – Summary of the Project Findings

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Summary of the Project Findings

Introduction

419. As indicated in the introductory section of this Report, our brief was to examine curriculum development at the secondary education and higher education levels in order to identify issues and features in curriculum development work which are of interest and value to curriculum workers within the further education sector. It is our hope that the Report will:-

a) contribute to a continued raising of the level of curriculum expertise within the further education sector;
b) provide potential curriculum workers in FE with useful hints and guidelines for their own work;
c) encourage discussion within FE and beyond of the general issues of curriculum development and implementation.

420. The main purpose of this final chapter of the Report is to present a summary of the main findings that have emerged from the study with particular emphasis on those issues and features which, in our view, have particular relevance to further education. In doing so it is important to recognise, however, that there are bound to be organisational differences between schools and FE colleges which make the direct transfer of curriculum techniques and styles from one sector to the other difficult, and perhaps in some instances impossible. Furthermore, since an analysis of the relationship, actual or perceived, between curriculum activities and organisational features within institutions was outside our brief, such relationships have not been articulated or explored.

The FE Curriculum Scene

421. In our overview of some 40+ curriculum projects (see Chapters 1 and 2 and Appendix 1) we looked in particular at the developments which had taken place in the secondary sector during the 1960's and 1970's. We shall now briefly consider the FE curricular scene during this same period, attempting at the same time to identify some of the ways in which the two sectors differ.

The Initiation, Funding and Organisation of Curricular Activities

422. In marked contrast to the situation in the secondary sector, curriculum activity within further education has been, until comparatively recently, predominantly a response to the need to develop courses related to syllabuses and guidelines produced by award making bodies such as the CGLI, RSA, TEC, BEC, NEBSS, CNAA and the Regional Examination Boards.* Furthermore, whilst there has in the case of TEC and BEC been an element of indirect financial pump-priming from the DES, with minor exceptions (eg. Schools Council and Nuffield Projects relating to school type provision within FE) sponsored curriculum activities characteristic of much secondary level development are conspicuous by their absence. Consequently, with the possible exception of lower level BEC schemes, there is in general very little project-type curriculum development based on the centre-periphery model to be found within the sector, and college-based activities, supplemented in some instances by an element of regional co-ordination, are much more the norm.

423. At the risk of oversimplification a case can be made for distinguishing, at this stage, between two major forms of curriculum activity. Firstly we have *curriculum development tasks* which entail both the articulation of intentions and their subsequent translation into appropriate learning experiences, an activity which may also include some degree of evaluation and assessment. A substantial proportion of the curriculum activity in the school sector has been of this type but as indicated by our analysis, the curriculum style adopted appears, over the years, to have undergone a considerable shift from a centre-periphery approach to curriculum development to school-based curriculum development. Secondly we have the type of activity which may be referred to as *course development tasks*. This involves translating predetermined sets of intentions, presented either as guidelines or as some form of syllabus and accompanied by defined assessment procedures,

* For further details see Russell, T.J. *Curriculum Control: A review of major styles of curriculum design in FE* FEU 1981.

into a set of educational actions which, it is hoped, will meet the stipulated requirements. Course development tasks are normally undertaken at the institutional level but there are some instances where such activities are co-ordinated at a local or regional level. Whilst both types of activity are characteristic of developments in the schools especially in the case of GCE courses, within FE it is the latter activity which is the predominant curriculum style, particularly in the context of vocational non-advanced FE courses. The characteristics of these two types of curricular activity are summarised in Fig. 6 overleaf.

424. As in the school sector, much of the curriculum activity within FE is a consequence of external pressures. For example, the Haslegrave Committee (1) was initially established as a result of political pressures seeking a rationalisation of course provision. However, the recommendation that both a Technician and a Business Education Council be established also reflects the Committee's recognition of the extent to which the concept of a technician had radically changed as a consequence of developments in industry and commerce. More recently we have seen another even more specific case of external pressures leading to curriculum change, in this instance with respect to pre-vocational curricular provision. Although there had been, for many years, attempts by bodies such as the ATTI and the NACEIC to initiate curriculum development with respect to the needs of the majority of school leavers who went directly into work, it was not until the mid 1970s that the DES felt compelled to respond to the challenge. The setting up of an inter-departmental (DES/D.of E.) review on "Getting Ready for Work" led to the establishment in 1976 of the UVP schemes and the Further Education Curriculum Review and Development Unit.

The Intention and Orientation of the Curriculum Activities

425. The current practice of referring to institutions as Colleges of Further Education rather than Technical Colleges reflects the extent to which FE has progressively embraced general as well as vocational education. Furthermore, there is now a third strand concerned with vocational preparation which is rapidly taking over as the major growth area. Consequently, curriculum activities within FE differ from those in the school sector in the following respects: they are linked with a much broader spectrum of needs in terms of subject area (eg. DES List 209, *Courses in FE Establishments*, identifies some 1500 different subjects); they span both general and vocational education; and the ages of the student target population can range from 16+ to retirement age.

426. When planning vocational courses it is important to recognise that:-

i. day- and block-release courses are based upon, and seek to complement, training and experience in industry and commerce. Thus, the aims of such courses are (supposedly) closely geared to the needs of industry. Furthermore, where individual students are not receiving a balanced training, steps need to be taken to provide appropriate "process experience" (ie. opportunities for practical involvement with processes not within their training programme and, in addition, craft experience as may be necessary in their own trade);

ii. in some instances the FE college is providing both education and training for its students;

iii. many of the teachers on such programmes will see their educational role as secondary to their training function.

427. When planning pre-vocational courses there is a need to recognise that curriculum design is based not only on an analysis of employment needs (or anticipated employment needs) but also on the more general needs arising from adult and working life. Thus, the needs-based approach to curriculum design which has traditionally featured in FE has, in pre-vocational education/training, been broadened to include other types of consideration. (See, for example "Developing Social and Life Skills", FEU (1980) page 5).

428. Here again there are major differences, especially with respect to the provision of non-advanced courses, between the situation in further education

CURRICULUM DEVELOPMENT TASKS

involve the

ARTICULATION of INTENTIONS

- Students' Learning Outcomes
- Teachers' (Pedagogical) Activities

and their

TRANSLATION into

- Learning Experiences
- Evaluation/Assessment Procedures

The strategies for undertaking such tasks range from a centre-periphery approach to institutionally-based curriculum development.

COURSE DEVELOPMENT TASKS

involve the

TRANSLATION of PREDETERMINED INTENTIONS

i.e.

- Guidelines or Syllabuses (Conventional/Objective format)
- Assessment Procedures (External/Internal)

into

EDUCATIONAL ACTIONS

Such tasks are generally carried out at institutional level but they may also be co-ordinated regionally or nationally.

Fig. 6: The Distinction Between Curriculum and Course Development Tasks.

and that pertaining in the school sector. In the context of the vocational, as distinct from the "voc-prep" scene, a substantial proportion of the overt curriculum activity has been concerned purely with the re-presentation of syllabuses in objective format. Indeed, with the exception of some of the BEC documents, occasional publications associated with the Colleges of Education (Technical)* and the OND guidelines, very little has been produced in the way of teacher materials providing suggestions on instructional procedures. Furthermore, there is an acute absence of curriculum materials for use by students, other than conventional commercial text-book type materials. Another major difference between FE and the school sector is that most vocational courses are based on groups of associated subjects and lead to the award of a group certificate on completion of the course. However, here again, with the exception of the BEC provision where attempts at integration are taking place, most non-advanced vocational courses are in practice unitary or modular with some attempt at the co-ordination of subject matter in a few isolated instances.

429. When we consider the pre-vocational scene, the situation is markedly different since both the FEU and the MSC are producing a growing number of documents which seek to provide teachers with guidelines relating to the planning of courses, suggestions about the student learning outcomes and resources guides. In addition the "CGLI Foundation Courses Explanatory Notes" are, to all intents and purposes, teachers guides. Both the Foundation Course Notes and some of the FEU documents provide examples of possible assessment procedures, including specimen profile outlines.

430. Whether the overt activity be the restatement of syllabuses in objective format or the undertaking of course development tasks at the institutional level, there is an underlying assumption that teachers within the FE sector will solve their curriculum problems either working as individuals or in groups in a given institution. Until the comparatively recent growth in staff development activities, there has been a distinct lack of teacher preparation for both curriculum development and curriculum evaluation. Furthermore, as many established FE staff also lack professional training, the pool of curriculum expertise available within the FE sector is still very much less than that now generally available in the school sector where the global curriculum development input has been very much greater and has also taken place over a much longer period of time. In addition, many of the secondary curriculum projects analysed, especially those which adopted a centre-peripnery approach, have included some elements of teacher preparation as an integral part of their overall strategies.

431. We shall now seek to relate our findings in the first instance to vocational courses within FE and then subsequently to vocational preparation schemes. In both instances the content is presented under sub-headings relating to aspects of the four key issues discussed in Chapters 3 to 6.

Vocational Courses

The Specification of Curriculum Intentions

432. In some respects, it would be true to say that curriculum development with respect to the school and higher education sectors has grown without there having been any real underlying theoretical basis for its conduct. As a result curriculum developers in both sectors have tended to use a variety of different terms without there being a clear agreement about the precise meaning of these terms and this had lead to a proliferation of jargon and, no doubt, to a confusion of terminology. We found this confusion to be particularly acute in relation to the designation of and classification of educational intents and have thus proposed (Chapter 3) that:-

a) a distinction should be made between statements of curriculum intent as they relate to *students' learning outcomes* and those statements which specify *pedagogical procedures* and *techniques* to

* eg. G Course in Science Teaching Project, Teachers Guide. Huddersfield College of Education (Technical) 1967; Midlands Teaching Project – ONC Basic Chemistry, Wolverhampton Technical Teachers College 1971.

be adopted by teachers;

b) within the area of curriculum intentions expressing students' learning outcomes, a clear distinction be made between aims, goals and objectives, as statements indicating an increasing specificity and preciseness.

433. It is clear that the confusion in terminology has also spilled over into the work of the Business Education Council and the Technician Education Council. Both bodies stress the importance of clear statements of course aims and have, in general, adopted a strategy biased towards the specification and statement of educational intentions in terms of students' learning outcomes rather than the specification of strategies to be adopted by teachers. However, whilst both TEC and BEC see objectives as representing statements which specify achievements required of students in order to obtain an award, some measure of confusion is likely to arise from the somewhat non-uniform use of the term "objective" in their respective guidelines.

434. In this context TEC documents are quite explicit, defining an objective as "a precise statement of intent describing some proposed change in the learner". Furthermore the Council goes on to say that "anybody reading a list of objectives should be able to decide how the behaviour, the performance, of a student is intended to be changed by the learning process specified ...." (2). Such statements indicate a clear commitment on the part of TEC to the presentation of educational objectives in a behavioural form. This is further amplified by the requirement that all objectives should be prefixed by the words "the expected learning outcome is that the student should .... (these statements are to be completed by the specification of a particular task of which the student is to be capable)."

435. Whilst the orientation of the Business Education Council is less strongly directed towards behavioural objectives, BEC, like TEC, recognises that statements of intent must differ in the degree of specificity and preciseness with which they reveal students' learning outcomes. To this end the Council distinguishes between *general objectives* which provide general direction for learning and assessment, and *learning objectives* which are intended as indicators or as a checklist for teachers in the planning and reviewing of teaching and learning activities (3). It is also interesting to note that BEC states categorically that learning objectives should not be seen as "behavioural objectives". In distinguishing between objectives of different specificity, BEC uses the terms *general objectives* and *specific objectives*. General objectives are seen as giving the teaching goals, whereas specific objectives are to be the means by which the student demonstrates his attainment of the teaching goals.

436. As indicated elsewhere in the Report, our view is that the excessive use of the word "objective", irrespective of the additional word qualifying it, is likely to lead to some confusion and/or inconsistency in the use of the term. It appears to us that "general objectives" as used by TEC and also by BEC, are essentially equivalent to "curriculum goals" as defined in this Report. In turn, TEC's "specific objective" would appear to have the characteristics of the "objective" in the terminology adopted in this Report. BEC's "learning objective" is less readily classifiable in terms of the terminology adopted by us. The lack of behaviourality associated with "learning objectives" takes us away, at least to some extent, from the notion that these objectives should, of necessity, specify students' learning outcomes. Indeed as BEC states explicitly, "learning objectives determine both learning and assessment methods". It is, however, difficult to see how any statement of educational intent can have this particular function and property. While different "learning objectives" may call for different types of instructional procedure and learning experience, it would be wrong to envisage the existence of a firm and inevitable relationship between curriculum objectives and the mode of instruction to be adopted to lead the learner to the achievement of the objectives. Nor does a particular outcome necessarily point to a particular method of assessment. What is crucial is that there is an appropriate measure of compatibility between the student outcome, the instructional procedures and the type of assessment.

437. In the light of the preceding paragraph, it is interesting to note the following comment on terminology in the report of an FEU evaluation of TEC programmes: "Since on the one hand there is a clear distinction in the use of these terms in TEC curriculum documentation, and on the other hand there is no universal agreement as to the most appropriate usage of these and similar terms in the specification of curriculum intentions, little would be gained by the discussion of possible alternatives. Of greater importance is for the designers and users of the (TEC) curriculum framework to share as common an understanding as possible of the terms employed." (4) Whilst recognising the possible validity of such a view in a narrow TEC context, one has to recognise firstly, that in general, FE staff teaching on the courses are also involved in teaching programmes validated by other bodies, and secondly, that FE workers cannot isolate themselves from other curriculum mainstreams outside FE and that, therefore, communication across educational sector boundaries is essential.

438. In our analysis of the aims, goals and objectives used in various curriculum projects, attention was drawn to the two different models of curriculum development that have been used, namely the *Objectives Model* and the *Process Model*. It was also noted that, in general, curriculum developers used the Objectives Model in subject areas which may be regarded as consecutive and linear. In contrast, curriculum development work in subject areas which do not allow a clear prespecification of intentions in terms of student learning, has tended to employ the Process Model, and relied upon the specification of the nature of the learning experience to which students are to be exposed.

439. Attention has already been drawn to the central role that curriculum objectives occupy in the general specification of courses within the BEC and TEC framework. We might, therefore, argue that the model invoked in curriculum planning activities within the BEC and TEC structure is that of the objectives approach. It would appear that this particular position favouring the Objectives Model was adopted by both BEC and TEC as a policy matter, rather than as the result of a detailed analysis of the appropriateness of the two curriculum models for development work in different subject areas. On the whole, we feel that the Objectives Model is appropriate for selected aspects of course development tasks in both the TEC and BEC context and furthermore, that it is particularly appropriate for TEC development work. It is our view that in the case of TEC much of the subject matter is likely to be of the linear and well structured type, and that this allows the actual formulation of objectives and curriculum goals in fairly precise and unambiguous terms. Thus, the essential conditions for a bias towards the Objectives Model of curriculum planning would seem to be fulfilled. To some extent this would also seem to be the case in relation to the development work sponsored by the Business Education Council. Yet, an analysis of the objectives developed for this particular development suggests that some of the objectives put forward are less behavioural, and hence, less precise than others. Indeed, one has to make the comment that certain "general objectives" put forward within the BEC programme, are in practice likely to be difficult to implement. Rather than being of the nature of genuine objectives, these statements seem to have the characteristics of curriculum goals. It may be that the *a priori* commitment to the objectives approach taken by BEC may, in some instances at least, have a hindering rather than helping effect upon curriculum and course planning. We would not regard it as inappropriate if, in the context of future revision work or further development within the BEC structure, the appropriateness of the Objectives Model itself were to be called into question and re-examined. Indeed, comments made in the Spring 1981 issue of BEC News about the growing shift in emphasis from "content" to "approach" would seem to endorse this view. Furthermore, some recent documents have given recommendations about the instructional procedures to be used in relation to the execution of cross-modular assignments (CMA's) and to those procedures deemed appropriate to the inculcation of skills associated with CMA's, such as problem-solving. Such a "mixed" stance is one which has been adopted by many curriculum projects in the secondary sector and is recognisable by its use of goals rather than objectives and by its guidance to teachers about the appropriate instructional procedures to be adopted in order to realise

curriculum intentions.

440. Despite these caveats we would want to emphasise that on the whole we favour a bias towards the objectives approach to curriculum and course planning, at least for those curricula and courses which lead to examinations and/or recognised qualifications.

The Organisation of Curriculum Content – Integration or Co-ordination?

441. In examining the issues of the organisation of curriculum content (Chapter 4), we took the deliberate decision not to review the whole range of facets that may be associated with this theme. Many of these facets have been amply discussed in the literature on curriculum theory and the interested reader is referred to texts such as those of Taba (5) and Wheeler (6). However, in passing it should be noted that two related decisions need to be taken prior to those connected with the integration or co-ordination of subject matter. The first concerns the selection and rejection of curriculum content; the second concerns the sequencing of that content.

442. Issues relating to the selection and rejection of curriculum content are usually resolved by virtue of two considerations, educational objectives and allocation of time. The objectives frequently point to certain content which needs to be covered, while the time available for a course/module/unit of work imposes its own constraints on the amount and type of content which can feasibly be covered. Issues relating to the sequencing of subject matter will, on the other hand, be generally determined by the perceived logic structure of a subject.

443. The selection/rejection of subject matter and its sequencing are important issues for the curriculum developer. However, we have confined our analysis and discussion to the concepts of integration (and co-ordination) because, as a form of organising curriculum content, integration has been widely advocated by curriculum theorists and a large number of curriculum projects have endeavoured to implement the principle of integration in practical terms. However, despite the wide usage of the term "integration", it soon became apparent from our analysis that different curriculum workers were using the term in different ways. On the surface it might seem that once again we are dealing with a problem of terminology and semantics but arguably the problem goes deeper than this and is essentially one of different and sometimes conflicting conceptions about what constitutes integration.

444. In order to resolve this particular problem, we have suggested that two different terms be used in order to indicate the attempt of bringing together different subject areas or part-subjects in the organisation of curriculum content. The first of these terms is *"integration"* and we suggest that this term be restricted in its use to denote *the synthesis of different subjects or part-subjects into a new area of learning in which the original component subjects lose their identity.* In turn, we suggest that where recognised subjects or part-subjects are brought together in a curriculum structure *without these subjects or part-subjects losing their identity,* this be referred to as *"co-ordination".* In our analysis we were able to point to a fair number of curricula which, although purporting to be integrated, are in fact co-ordinated in the sense in which we use the term here. A further clarification which we felt appropriate to make concerns the existence of two different types of integration. On the one hand, several examples can be quoted of integration which takes place within a broad disciplinary area, embracing different subjects but with underlying common characteristics. In particular, one can point here to the traditional science subjects which have much in common as regards their conceptual basis and the processes whereby they are pursued. Integration of the sciences would result in a form of curriculum content which would retain some of the concepts and processes which are common to all of the sciences. In this case we would clearly be referring to integration of an *intra-disciplinary* type. However, other examples exist in which through integration the attempt is made to cross traditional disciplinary boundaries, bringing together elements from distinctly different fields of learning and merging these into a new subject study area altogether. Integration of this type, as is apparent, for example, in the Humanities Curriculum Project, we have referred to as *inter-disciplinary* integration.

445. Our concern to evolve a clear and rational set of definitions and descriptions of integration and related activities is not merely a matter of academic interest. We believe that in the past much confusion has arisen in the minds of curriculum implementers in two main ways: firstly, they were sometimes insufficiently clear about their reasons for wanting an integrated as opposed to a differentiated curricula; and secondly, having made a decision to integrate, they were not always sufficiently conversant with the theoretical principles on the basis of which an integration of subjects can be brought about in curriculum development.

446. Earlier in this report (Chapter 4) we referred to the "merger principle" which must be used if genuine integration is to be achieved. This principle can be used in two ways:-

i. as a "rationalising" device with respect to subject areas which are to be found within the same discipline. Here the rationalisation is based on a recognition of the commonality of concepts, methodologies and enquiry modes of these subjects;

ii. as a means of bringing a wider perspective to bear on a particular theme or issue. Here the different contributions would come from different fields of knowledge/discipline areas. In this situation, the theme or issue can be so formulated as to constitute a problem; the contribution of the different subjects would be brought into play to solve or try to solve the problem. Irrespective of the way in which the "merger principle" operates, a loss of identity of the individual contributing subjects should occur.

447. However, if the intention is that the identity of the subjects is *retained* but the linkages are established between subjects so that either their similarities or dissimilarities are highlighted, a quite different decision has to be made which involves the deployment of strategies different to those used when integrating. Here the "association principle" links or co-ordinates subjects in such a way that their distinctive characteristics are not lost. (The various strategies whereby this can be achieved are described in Chapter 4). It is, therefore, important for curriculum developers to make informed judgements about when and in what circumstances an integrated approach is desirable and to bear in mind the advantages to be gained from retaining a differentiated, albeit co-ordinated, approach.

448. Within FE, some of the recent curriculum development work reflects a decision to integrate. This is particularly prounounced in the case of the work of BEC which has attempted to bring together aspects of the more traditional subject areas falling broadly within the scope of business studies into four new major areas, Money, People, Communication, and a Logical and Numerate Approach to Business Problems. We would class this attempt as one of genuine integration centred on the four themes. However, we would also criticise BEC for an ineffective communication of the rationale for this particular mode of integration. We cannot help feeling that some of the implementation problems* which have arisen are, in part at least, a result of this failure to communicate adequately the "merger principle" to both staff and students. It has to be borne in mind that many staff, if not the majority, working in the colleges are single-subject specialists who are bound to encounter difficulties in the conceptualisation of work which not only extends beyond their specialism but also demands the adoption of teaching approaches which differ radically from what they have been used to. We would not feel it inappropriate for the Business Education Council, even at this relatively late stage, to make the philosophy and reasoning underlying the importance of integration within its courses more explicit, thus helping to create a better and clearer understanding of its intentions by the "consumers".

449. In contrast to BEC, the Technician Council has not pursued the concept of integration to any

* eg. The second annual review of standards 1979/90 draws attention to the fact that course teams find difficulty in deciding what "interdisciplinary work" means for General Awards students.

significant extent and in this context the question arises as to whether or not the Council explored the possibilities of an integrated approach. Whilst such an approach would seem to be particularly appropriate in relation to engineering programmes where concerns go well beyond traditional subject boundaries, the unitary approach advocated by TEC is in practice incompatible with the notion of integration. The potential danger here is that the pursuit of a unitary approach based on relatively small course modules can lead to an undue fragmentation of the overall educational experience to which the student is exposed. It may also result, in certain instances, in an incompatibility between, on the one hand, course structures which are based on a normal longitudinal development of themes and, on the other hand, a large number of independent separate course models. The problem in the latter case is that insufficient co-ordination and linkage may exist between the courses and that the student fails to transfer knowledge gained in one module to another module. If this problem arises, and there are indications particularly in some of the science areas that this may be so, we would strongly recommend that the practice of curriculum co-ordination be advocated by the Council as a means of remedying such shortcomings. Indeed there are indications from the Council's current review of its policies that it is actually thinking about alternatives to the unit-based structure in some instances, and the introduction of "grouped courses" for certain higher awards; this, if it comes about, should provide an opportunity for attending to the underlying curriculum issues.

Instructional Procedures – A Focus of Decision Making

450. It is self-evident that the planning of an educational course or curriculum requires decisions to be made about how a subject should be presented and taught; what kinds of learning experience the student should be exposed to; and whether the learning should be controlled by the teacher or be to some extent self-instructional and/or resource-based. One cannot but reach the conclusion from an analysis of curriculum development work at the secondary level that decisions about instructional procedures, especially in the early curriculum projects, were taken almost entirely on pragmatic grounds and on the basis of firmly held beliefs about the superiority of some instructional procedures compared with others. We have not, in the context of our study, presented any research evidence dealing with the question of what educational benefit can be *shown* to be associated with different instructional procedures and sequences. Suffice it to say, however, that many of the commonly held assumptions about the different benefits of various instructional procedures are not borne out by research results.

451. We hope that the analysis of instructional procedures conducted as part of this study will introduce potential curriculum developers in FE to the range of procedures available as well as to their characteristics, and also provide them with a rational basis for decision-making as regards the choice of instructional procedures for their courses. We also hope that this will help to remove some of the unwarranted pragmatism that has in the past been associated with a choice of instructional procedures.

452. Decision-making about instructional procedures is essentially decision-making about what learning approaches are to be adopted and what conditions for learning are to be established. In our view, this is an area which presents teachers of vocational courses in FE with a particularly demanding challenge as most of the bodies influencing or controlling such work within the sector are predominantly concerned with either the validation or the examination of courses. With the possible exception of BEC, the main function of these bodies, lies in the specification and identification of standards to be associated with different qualifications and the development and administration of appropriate examinations and assessments. In general, pronouncements about what instructional procedures are to be adopted by teachers within FE are not part of this brief.

453. Although much of the teaching in the secondary sector is also geared to the requirements of external examination bodies, the situation in

schools is somewhat different from that in FE. Firstly, in many instances teaching programmes linked with examinations (eg. the Nuffield GCE science schemes) are based on complete curriculum packages which specify the instructional procedures in detail. Secondly, even when the teaching is based on a more conventional examination syllabus, there exists today a very substantial amount of curriculum material, as distinct from text books, which can be used as aids to teaching. Therefore, the extent of decision-making in relation to instructional processes which has to be exercised by the FE teacher is often considerably higher than that exercised by the teacher in secondary education.

454. Our perception of the present position with respect to vocational courses in FE is that there still exists a widespread and strong adherence to the practice of traditional teaching approaches. By traditional we mean those approaches where learning is largely teacher-directed and the learning outcomes are predominantly teacher-controlled and in which the primary role of the teacher is that of a disseminator of information. Without positive action to initiate the appropriate curriculum activities, this is a situation which is likely to remain substantially unchanged for many years to come. One major area where there are clear indications of imminent radical rethinking is that of engineering craft courses. The recommendations of the Hargreaves Committee (7), reflecting as they do current curriculum thinking in the United States, Australia and some parts of Europe, are to be welcomed in that they include a positive move towards the "provision of appropriate support material for teachers and students to use in addition to the usual scheme information published by the Institute; the provision, financing and distribution of such material may need closer co-operation with authors and publishers" (Recommendation C (c) (vi)). However, whilst recognising the extent to which such a move represents a break with tradition, one can only hope that the CGLI and the Regional Examining Bodies will be stimulated to go one step further in this important process and instead of leaving the task to individuals take positive action to set up working parties of teachers and specialists to produce such materials. Were this to be done, not only would individual teachers be provided with guidelines but in addition there would also be a sizeable spin-off effect in terms of curriculum implementation.

455. Whilst we have drawn attention to the likely changes regarding engineering craft courses, it is to be hoped that similar re-thinking will soon take place under the auspices of the other major examination bodies. The RSA, although stipulating that "curriculum development has continued to play an important part in the Board's work" (Report on "Examinations in Sessions 1979-80", Part 1 p.10), is in practice, like the CGLI, predominantly concerned with the revision of syllabuses and in some instances their restatement in the form of objectives. Though such activities have been paralleled by more fundamental changes in connection with some of the RSA teachers' certificates, in general there seem to be few if any, indications of concern about the necessity to stimulate thinking about the instructional procedures to achieve the stated intentions. Indeed, in our view, there is a clear need to expand all centralised syllabuses for vocational subjects to include sources of information and suggestions concerning experiments, demonstrations, case studies, and so on, in line with, for example, the London 'O' level chemistry syllabus presentation. Additionally there is a case in some instances for producing a limited number of teachers guides to accompany such modifications.

456. Another major growth area within vocational provision is, of course, business education. Under the auspices of BEC, more thought has been and is increasingly being given to instructional procedures, though the advice could still be considerably expanded. More recent BEC documents, for instance, have given consideration to the way in which problem-solving skills can be brought into play on the part of the student. The use of projects based on local studies and local material, the use of role-play, group work, simulation and job experience is advocated. However, in spite of such developments, more thought still needs to be given to the relationship between problem-solving and the instructional procedures conducive to the development of this ability in students.

457. A useful reference point is the Schools Council Geography 14-18 project which puts considerable emphasis on student-based, enquiry-oriented activities which enable an involvement in "the processes (professional geographers) use to solve problems and to individualise learning in a way which takes account of divergent interests and different learning styles". In this context the project has given special consideration to three instructional procedures: the use of classroom questioning; group work involving problem-solving activities by students; and individual study. It suggests that questions be framed in a way which elicit answers that draw on different intellectual skills (comprehending, analysing, evaluating, etc.) and has produced a matrix featuring exemplary questions with a commentary to show the intellectual processes they involve. Another matrix in the teachers' handbook illustrates different sizes and types of group, different learning activities and perceived advantages. Lastly, the handbook makes reference to the work of Bloom and Gagné on the sequential organisation of problems and makes the point that if the aim is "to relate basic strategies of enquiry to ordinary life, thought and experience", a useful strategy is the notion of "mismatch" problems. This involves directing the students' attention to some incongruence between their everyday taken-for-granted perception of the world and some reconceptualisation of those perceptions through an acquaintance with new information, and providing students with opportunities to sample a variety of intellectual processes involving the recognition and solution of such problems. The problems are of different types and involve different types/levels of precision. A matrix is again provided to illustrate this.

458. Although problem-solving is considered further in the section on Vocational Preparation Schemes later in this chapter, any FE lecturer interested in problem-solving would do well to look at the teachers' handbook for the Geography 14-18 project "Geography 14-18: a handbook for school-based curriculum development". There is also guidance on the setting-up and use of individual study/project work involving "the use of sources, their limitation, interpretation of data, the application of principles, the clarification of value and the communication of the results of the enquiry".

459. Finally, let us briefly consider the various attempts being made within FE to stimulate thinking about alternatives to the more traditional teaching approaches which characterise the sector. Major contributions to this initiative include the CET Open Learning Systems project which played such an important role in highlighting the issues to be faced the Flexi-Study developments arising out of links between Barnet College and the National Extension College and the MSC's Open Tech discussion document which provoked even more discussion than the CET consultative document. It is immediately apparent from such initiatives that Open Learning has already taken hold of the FE system and that the pace of development is likely to accelerate over the next few years.

460. However, as indicated in Open Learning for Technicians (8), the report of an investigation carried out by the Guildford Educational Services (GES) for the CET, TEC and MSC, "the successful development of such systems involves the balancing of factors which are largely outside the control of those responsible for developing the system, with those which are largely within their control". Whilst the GES Report is unequivocal in its message, in practice the evidence from some of the comments made in response to documents such as the MSC's Open Tech programme, including the Open Tech Group Report (MSC June 1982), point to an undue preoccupation with organisational aspects at the expense of the more fundamental thinking about the underlying curriculum and pedagogical issues in this complex field. It is our hope that our review of personalised systems of instruction (see Chapter 5) will be seen as a contribution to the thinking about the underlying issues which are to be overcome if we are to help FE teachers in the vital task of developing an effective Open Learning system within the sector.

Assessment and Evaluation in Further Education

461. As indicated earlier, the decision to include a major section on assessment was based on the realisation that as a consequence of recent and current developments, FE teachers are becoming progressively more involved in assessment procedures. Furthermore, it was also recognised that

a continuing need for increased course provision and curriculum development creates a need for evaluation studies and that assessment procedures are often a major component in such studies. We must, however, reiterate that since assessment and evaluation are not an integral part of curriculum development *per se*, the focus of our study has been an analysis of current assessment practices and techniques in general, including those prescribed by the various examination boards.

462. Our review shows that the developments which have taken place have been predominantly in the cognitive area and to a lesser extent in the assessment of practical skills. In this latter context the major developments are associated with the sciences and reflect a shift from formal practical examinations to teacher-based assessment. It is our view that much of the development described is of direct relevance to the FE sector because many of the assessment tasks in FE are similar to those in the secondary sector. This is particularly so when courses lead to recognised qualifications.

463. One instance of this direct relevance is to be found with TEC's current concern* about "an apparent diminution in the amount of practical work (laboratory and workshop exercises) being used by teachers of TEC programmes in comparison with previous technician courses". It is interesting to note that:-

a) whilst TCL 11/80 identifies what it considers to be the four main factors contributing to the fall-off in practical activities, it completely ignores what we would consider to be an even more crucial factor, the tendency, particularly in TEC's early documentation, to equate practical skills with motor skills.** As a consequence one is not surprised that many FE staff faced with an over-full content to cover when teaching TEC units should respond by reducing the amount of practical work to a level corresponding to the minimum necessary to meet the motor skills element in the accompanying assessment schedule. Hence it is pleasing to note that subsequent standard units in the sciences, for example, include a direct reference to the need for a given percentage of the teaching time available to be used for practical work;

b) TCL 11/80 also stipulates that "the Council will take measures to encourage the use of practical activities but at this stage does not intend to issue any guidance which might be interpreted as being prescriptive of teaching techniques". Whilst this is to be expected in the light of TEC policies on instructional procedures, we see no reason why the Council should not consider utilising its assessment procedures as a means of producing a better balance between theory and practice. Experience in the school sector has shown that the direct observation of students undertaking practical work, has enhanced the value of such work and contributed to a more meaningful method of assessing the various aspects of practical skills, esp. in the sciences. However, whilst the procedures introduced by GCE boards for the teacher-based assessment of practical skills should prove to be of value in FE also, their procedure for "moderating" (standardising) such assessments may not be appropriate for FE. The standard procedure for 'A' level chemistry, for example, is to use students' overall results on the compulsory components of the theory examinations as the external measure with which to compare teacher-based grades for practical work. Whilst this approach may be acceptable in the case of many students, particularly the more academically able, it may be quite inappropriate in the case of those skilled technicians whose practical skills are superior to their purely cognitive skills.

464. Earlier in this chapter (para. 454) we drew attention to the Hargreaves Committee Report on Engineering Craft Schemes and its proposals for the

* TCL 11/80 Laboratory/Workshop Exercises in TEC programmes.

** e.g. TEC Guidance Note No. 8 July 1979 2.2(a) "Where a unit involves practical skills and objectives, i.e. motor skills ...."

production of support materials for use by teachers and students. The same report identifies the need for more diversified forms of certification, including types which record actual achievements in individual subjects. In the context of assessing the practical elements there is a clear need to introduce procedures other than those advocated in the CGLI manual on "Constructing Practical Tests" and one possible way forward would be to investigate the feasibility of utilising aspects of the procedures relating to the JMB and London 'A' level schemes in Engineering Science (Chapter 6). At the same time it might not be inappropriate also to think through the implications of such schemes for TEC programmes, especially the full-time programmes, where project work is an important element.

465. In contast to the situation pertaining in the cognitive and psychomotor areas, the assessment of affective characteristics is distinctly less well developed. As indicated in our review, this can in part be explained by the inherent difficulties associated with the assessment of qualities which cannot readily be associated with overt, and hence, measurable manifestations. Yet, almost without exception, we found that curriculum projects emphasise the importance of affective outcomes from their courses and in the absence of genuine attempts to establish whether or not these outcomes are achieved, one must wonder how meaningful such statements expressing affective intentions really are.

466. It is, therefore, not surprising to find numerous examples of such statements within the current FE vocational scene. For example, TEC Circular 3/75 stresses that:-

> "Every programme should aim to develop the student's ability to think, to grasp ideas and to communicate effectively. Adaptability, curiosity, self-confidence, independence of thought and the power to make critical judgements are personal qualities that should be given every encouragement to grow. In this way the student will learn to make decisions, to exercise initiative, to respond to change, to act as an effective member of a working group and to supervise the work of others where this is required."

The document "BEC General Awards" stipulates that programmes should

> "encourage the development of the attitudes and skills needed by those students who deal, or wish to deal, with members of the public at the point of sale, point of purchase, or otherwise in an organisation";

and

> "help the students to develop a realistic understanding of employment in business, distribution and public administration, ideally through a period of work experience or, if this is not possible, through simulated exercises".

467. However, the position with respect to the assessment of affective characteristics is more problematic in FE than it is in the secondary sector because of the inbuilt certification requirements associated with vocational courses. As a consequence the assessment procedures do not truly reflect the original intentions as stated. This is to be much regretted for two reasons:-

i. the resulting conflicts which arise when FE teachers are seeking to implement such curriculum proposals and to produce appropriate assessment procedures;
ii. the tendency for elements, which should be a central feature of vocational courses within FE, either to be ignored completely or just paid lip-service to once stated as part of the original intentions.

Clearly this is an area which course planners need to be mindful of and we would urge most serious consideration of whether such characteristics can be achieved through the use of appropriate instructional procedures and whether or not they can be meaningfully assessed.

468. During the last ten years selected aspects of the FE vocational scene have been subjected to a curriculum upheaval initiated by examination/validation bodies. In contrast to the situation in the school sector, the resultant changes have been introduced without trials and in general there has, until recently, been little if any evaluation of any kind. Furthermore, the schemes which have been introduced have rapidly replaced the existing schemes without any real attempt at comparison. Such a state of affairs contrasts very sharply with the global

curriculum scene outside FE post-1960, when financial support for curriculum development was relatively readily available and some form of evaluation was thus feasible. Whilst recently established evaluation studies in relation to TEC and BEC schemes, are to be welcomed, the curriculum challenge being faced is a substantial one. It is to be hoped that the related validation/examination bodies and the teachers concerned can act in concert in whatever manner is appropriate in the light of such studies. More important, however, is the need to ensure that no major curriculum activity is initiated without an adequate measure of formative evaluation on the basis of which the viability of a course can be assessed and if necessary, its effectiveness enhanced. This need is as important for courses designed within the framework of an external syllabus as it is for college-based curriculum programmes.

Vocational Preparation Schemes

469. The most recent curriculum challenge facing FE institutions is the provision of vocational preparation programmes for young school leavers whether employed, unemployed or on full-time pre-employment courses, who are not otherwise involved in vocation-oriented or academic programmes. The "voc-prep" scene is one where both the size and the characteristics of the target population, overall some 50% of our 16-19 year olds, and the essential nature of the curriculum task now being attempted are inevitably making demands on FE staff far in excess of those arising from the development vocational programmes leading to recognised qualification. These demands arise from the following considerations:-

i. as indicated above the target population for "voc-prep" programmes comprises some 50% of all 16-19 year olds; it is extremely heterogeneous in terms of ability, experience and educational needs. Furthermore such young persons may be employment-based or work experience-based and/or institution-based (in college or school);
ii. until comparatively recently few persons of the type outlined under i. have been found in FE colleges. Many staff are still unfamiliar with this type of student and the motivations and learning behaviours which the target population may exhibit;
iii. the aims of vocational preparation have until recently been unclear and although the situation is improving, there is still a dearth of curriculum materials, particularly in some parts of the country, on which FE staff can draw for the development of "voc-prep" courses.

470. The FEU document on "Vocational Preparation" (1981) reflects the Unit's curriculum contribution to recent initiatives on education and training and brings together the thinking in previous FEU Reports, especially:-

i. "Experience, Reflection, Learning" (April 1978) which provided guidelines for organisers of schemes of Unified Vocational Preparation (UVP);
ii. "A Basis for Choice" (June 1979), which is the Report of a Study Group on Post 16 Pre-employment Courses;
iii. "Developing Social and Life Skills" (January 1980) – a document expanding on a central component of the FEU contribution to the Youth Opportunities Programme (YOP).

471. In curriculum terms, what we have here is an approach which seeks to conceptualise vocational preparation through a *curriculum framework* within which teachers will devise their own programmes. The approach throughout is one of flexibility, catering for student needs (both group and individually designed) and taking account of institutional and extra-institutional variables in a given locality. Clearly this represents a very significant departure from the standard approach traditionally adopted with respect to vocational courses with their more narrowly defined set syllabuses, and as a consequence and not surprisingly, there is a number of problems associated with the major task of implementing the guidelines which have been advocated:-

i. Whilst much of the initial thinking concerning the aims and components of vocational preparation has been undertaken by the FEU, the actual curriculum development tasks are

being accomplished within FE institutions. An initial task that arises is for teachers to grasp the essential features of "voc-prep" and to understand the ways in which it differs from "traditional" further education provision. Of particular importance in this context are:-

a) the recognition by FE staff of the extent to which vocational preparation combines both education and training;
b) a realisation of the implications of developing and working within a curriculum structure to which not only teachers, but also students, employers and other agencies including training boards and voluntary organisations, are expected to contribute.

In the case of the teachers, the substantially increased participation in curriculum decision-making calls for the acquisition of appropriate curriculum design skills, increased interaction with colleagues in collaborative planning and a willingness to incorporate new teaching and assessment procedures into their professional reportoire. The demands of the student-centred "active" schemes envisaged in the three documents require of teachers a heightened awareness of the needs of young people, the skill to negotiate with them the content of their learning and the ability to assume, on occasions, the role of a learner as a participant in carefully designed experiential learning The changing students' role is reflected in the fact that young people involved in vocational preparation schemes are called upon to articulate their needs and to use previously acquired skills, interests and experiences as a platform for the building of further experience and enhanced achievement. They are expected to shoulder, under guidance, an increased responsibility for their own futures and to view FE staff not as "all-knowing" instructors but as interested and committed people who "genuinely care for their well-being both personally and vocationally". In addition, employers may be directly involved in the design of vocational preparation schemes and, particularly in the case of UVP, in their implementation and on occasions their assessment. They will also play a part in the formulation of objectives (see reference to the A - Z study in section 6 of "Developing Social and Life Skills") and in providing work experience.

ii. The assumption implicit in the approach advocated in "Vocational Preparation" with its emphasis on college-based curriculum development is that FE teachers either already have the necessary curriculum expertise or will in due course develop this expertise. However, in the context of further education both assumptions are problematic; there is an element of realism in the document which advocates the need for an intensive staff development programme coupled with plans to produce additional documentation, including case studies. Whilst one hopes that such a programme will in due course raise the level of expertise, one is prompted to ask whether it might not also be appropriate to adopt a centre-periphery planning approach as a means of bridging the gap. Whilst one accepts the need for both flexible and student negotiable programmes, surely there must be some common elements within the total anticipated provision which could be rapidly identified and subsequently developed by a small team. Such materials, which would become examples of core materials, could then be tried out in the colleges and subsequently revised prior to more general circulation. Indeed there is very clear evidence from the achievements of the West Midlands Regional Curriculum Base that regional co-ordination of this nature is both feasible and productive.

iii. Another problematic area is the extent to which current demands for certification are in fact compatible with the type of assessment procedures originally envisaged. Due to external pressures we are now faced with a situation comparable with that pertaining to many curriculum projects in the school sector where projects initially planned and developed to meet non-examination conditions were at a later stage linked to some form of formal assessment. Our analysis of developments in the school sector suggests that compatibility is

most likely to be achieved when the examinations are of the Mode III type. It is to be hoped that in the implementation of vocational preparation programmes any major shift towards a formal, centralised (external) examination will be questioned and that college-based assessment, albeit with external moderation, will be probed further.

iv. The fourth and in some ways the most immediate area of concern arises from our experience of current practice within colleges attempting to develop programmes within the curriculum framework of vocational preparation. In general college staff owe much to the ideas in the four FEU Reports already referred to:-

Vocational Preparation
A Basis for Choice (ABC)
Developing Social and Life Skills (DSLS)
Experience, Reflection, Learning (ERL)

The guidelines in these reports have substantially influenced later documents produced by both the FEU and the MSC. In practice, however, there are inherent difficulties arising partly from the fact that these documents were produced at different times by different groups of personnel, and partly because they represent on-going thinking. Consequently they are, to some extent, both lacking in operationality and are somewhat inconsistent in preparation.

472. We now propose to review these documents in the light of what we have learnt from our analysis of curriculum development outside the FE sector. We hope that our comments will contribute to the important task of operationalising the concept of a curriculum framework within which vocational preparation programmes are being devised. Furthermore, although our comments may at times seem unduly critical, it should be recognised that the underlying intention is to be constructive and to facilitate and promote positive and effective course development.

Curriculum Intentions and Approaches to Curriculum Development

473. Of the three documents, only ABC offers (for its Common Core) a formal list of aims*. These reflect a particular stance about the nature of vocational preparation, stressing the need for young people to acquire certain basic skills and knowledge, to be involved in "real-life" experiences, to grow towards self-reliance and responsibility and to understand their social and working environment and the various roles they will be called upon to play.** Taken on their own though, these aims, like any other aims, have little operational meaning and (in ABC) are supported by further specifications and guidance to implementing teachers (under the heading "Objectives/ Experiences" and the accompanying "Commentary"). However, the additional information provided is brief and can serve only as a pointer to possible topic areas, teaching approaches and experiences related to the achievement of the aims. The intention is to accord maximum autonomy to schools/colleges to develop schemes within the constraints and opportunities of their own locality.

474. Whilst some institutions have the means to respond creatively to the challenge of such autonomy, others will be looking for greater guidance. As the twelve aims of ABC are not explicitly linked to subject-based content, one approach to course planning is to start with a consideration of the contribution traditional subjects can make. This involves not only identifying specific items of knowledge but more importantly those processes characteristic of certain subject areas which can provide young people with transferable skills (eg. problem-solving from design and technology; modelling from mathematics and geography; measuring and predicting from science). Some of this thinking has already been undertaken in ABC; for instance, numeracy skills have been specified in some detail (Aim 6). (See also "Geography and Pre-employment Courses in the

* The same aims feature in the later document, "Vocational Preparation" as a suggested common core of aims for vocational preparation courses, be they YOP, UVP or college-devised (ABC) ones.

** This stance is similarly reflected in the numerous other statements and phrases which appear in all three documents – "participatory experience", "student-centred learning", "problem-solving approaches", seeing young people as "equal participants in a dialogue about their needs and the best way to satisfy them."

Sixth Form" (March 1981)*.) There are, however, substantial advantages to be gained from identifying and communicating to colleges (perhaps in a future FEU document) other elements of content which could be included in the core. For instance, the suggestion that sessions in scientific method be organised (Aim 8) will best be achieved if young people are given an opportunity to undertake investigative work based on an appropriate (specified) scientific content. Such a document would serve not only to translate the ethos of vocational preparation into practice but would give valuable assistance to those staff who lack both confidence and experience in developments of the kind envisaged in the ABC proposals.

475. In this context, a teachers guide (or series of guides) based on a range of detailed case studies (reflecting "good practice") could offer information and guidance of a curriculum nature about the range of subject-related content (both conceptual and processes-oriented) which has been (or could be) used for achieving ABC aims. It could also describe the various experiential situations which different institutions have staged for young people, the perceived skills and abilities which were acquired and their relationship to the stated aims. A good example of what has already been done in this kind of curriculum situation are the teachers guides for the School Council Design and Craft Education project which, like ABC (and ERL and DSLS), provide teachers with a curriculum framework and a set of intentions. These intentions specify abilities and skills which arise, in this case, from the design process (intellectual skills, such as problem-solving, decision-making skills and motor skills) and which additionally imply generic skills applicable in the adult world (obtaining, exploring and analysing information, defining problems, formulating solutions, etc.) The extensive, illustrated case study material contained in the various teachers guides describes in detail the setting-up, organisation and benefits of a range of experiential situations involving the application of the design process in a social context, such as constructing furniture in an old folks home, designing a piece of equipment for a local play group, and participating in restoration work in the area. Additionally it delineates the specific and generic skills acquired by students from involvement in these activities and links these to the aims of the project.

476. The suggestion of a teachers guide for use in conjunction with ABC proposals also requires consideration to pre-requisite skills. The proposals assume learning skills which the young people may not have (eg. interviewing and questionnaire construction) and curriculum skills which staff may not have, not only with respect to the selection of appropriate content which has already been mentioned but also knowledge of and practice in a range of instructional procedures. If the intentions of ABC are to be realised, guidance about establishing the necessary pedagogical conditions must be given and such guidance must be linked to appropriate staff development programmes as suggested by the FEU in "Teaching Skills" (June 1982).

477. The meaning of the word "objective" varies considerably from one document to another. Here are the definitions variously given:-

ERL: "what the tutor or scheme organisers intend the young people to have acquired or understood. It is not necessarily meant to imply a description in terms of student behaviour" (page 23);

ABC: No specific definition is given though it is stated that "some objectives will need to be described as a combination of experience and performance, others in terms of experience or performance only" (page 22 para. 53);

DSLS:"both what and how it is intended the student should learn" (page 13).

ERL and DSLS couch objectives in terms of the teachers' intentions and not in terms of student outcomes as one would expect (see Chapter 3 of this Report). As teachers called upon to implement the ERL proposals, have most likely been subsequently involved in the implementation of ABC and DSLS, they must inevitably experience considerable confusion about the meaning of "objective". We would recommend consistency of definition in future FEU publications with due recognition of the two modes of expressing educational intentions

* A joint initiative by the Schools Council Geography 16-19 Project and Sheffield LEA to investigate the contribution that Geography can make to the aims of ABC.

suggested in Chapter 3. If "objective" is used to indicate the highest degree of specificity of students' learning outcomes, *what* in a detailed sense the student is expected to learn, and "experience", *how* the student is intended to learn, is subsumed under "teacher activities" (those learning experiences, conditions and climates to be arranged by the teacher for the student), not only would confusion be reduced but also an explicit recognition would be made of two contrasting approaches to curriculum planning. In situations where the student's achievement is measurable (eg. the attainment of a given standard of literacy) the use of the term "objective" is entirely appropriate; where the student's achievement is less easily measurable or where it may manifest itself in many different behavioural patterns (eg. the attainment of a given standard of social competency) the use of the term "teacher activity" or "learning experience" is appropriate.

478. ABC distinguishes between different kinds of educational intentions by the use of the terminology "Objectives/Experiences". Unfortunately, the document does not always make clear the purpose of the learning experiences and furthermore, some of its proposals appear to rest on an in-built assumption that a learning benefit will follow automatically from, for example, a situation where students are given an opportunity to work in groups or visit a particular institution (see Aims 10.1 and 10.2). There is a danger that such activities will become nothing more than entertainment unless they are linked more explicitly to educational intentions. Stenhouse states that the educator has a responsibility to choose curriculum content on the value judgement that certain activities are worthwhile in themselves but that he has to make clear the grounds on which he believes them worthwhile. If future documents supporting or modifying ABC could give some further thought to delineating the relationship between involvement in the suggested experiences and the attainment of the ABC aims, such information would be of great value to implementing staff.

479. DSLS attempts to express more open-ended student outcomes by coining the phrase "process objectives", stating that the "processes" they seek to describe "emphasise continuous development" and "can never be mastered, only improved".* While arguing that the use of "objective" is misplaced here, one would expect in this context that "processes emphasising continuous development" would tend to feature affective qualities/characteristics, those areas where the curriculum planner is encouraging a unique, personalised response on the part of the student. Looking at the list of examples, however, we find that, with one or two notable exceptions (eg. "show a willingness to receive new evidence on an issue") this is not the case. In the main, the illustrations provided are simply more vaguely worded and less specific than those of the "product objectives" and so give a somewhat false impression of open-endedness. It could also be argued that the differences between "list the sources of information about local job vacancies" (a "product objective") and "seek information and organise it into frameworks" ("process objective") could be that the latter involves higher level cognitive skills but is not necessarily any more open-ended than the former.

480. It is difficult to see from the exemplification how the "product objective" differs in nature from the "process objective" and it seems that both DSLS and ABC have experienced some degree of difficulty in finding an appropriate means of expressing those educational intentions which do not express predictions in any precise behavioural types of student outcome. In contrast ERL places its emphasis on recommendations about the teacher's activities, his/her pedagogical actions and the nature of his role, as well as specifying the conditions for instructions. Thereby, it manages to identify more adequately and fully the nature and purpose of the learning experiences to which the students are exposed.

481. In Chapter 3, we have described the two principal models used for curriculum planning, the Objectives Model which always stresses intended educational outcomes in terms of *student achievement* and the Process Model which focuses

* It is also stated that "educational process must embody certain basic values such as rationality, respect for persons, and acceptance of consistent criteria. To call a process "education" is to assert that it embodies certain values as principles of procedure". This is a sentiment which is implicitly reflected in ABC and in the philosophy of vocational preparation generally.

on *teacher activity, pedagogical actions,* the *nature of the teacher's role* and the *conditions of instruction to be created.* The assumption underlying this second model is that the prescribed learning experiences and pedagogical action provide an appropriate means of achieving the broad intentions of the curriculum. ERL demonstrates, in an explicit manner, a bias towards the Process Model, one which we have identified as the most frequently and successfully used in curricula designed to teach social and life skills and for the development of personal values and attitudes. There is also in ERL a consideration of the role of objectives, their derivation, balance and analysis but this latter is subordinate to the emphasis on teaching approaches and learning conditions. Additionally the relationship between the mode of instruction and the attainment of a particular type of achievement (eg. skills, information, concept or attitude) has been given thoughtful consideration (see Page 47 of ERL). DSLS too has an adherence to the Process Model, though its recommendations lack the operationality of ERL. Thus, despite giving considerable space to the notion of objectives, it is the seven models describing teacher behaviour and pedagogical strategies which nevertheless dominate the document's proposals. This emphasis is, however, as already commented upon, regrettably less marked in ABC. In this instance intentions are presented as "Objectives/Experiences" but many lack operationality and specificity and are more in the nature of curriculum "goals" as defined in this Report.

482. Experience in the secondary sector has shown that using goals as a planning tool does have advantages. They can be devised at national level (viz. ABC proposals) and can be broken down into more specific intentions at local level. They provide a forum for teacher discussion and allow meaningful development work to take place in full awareness of student needs, organisational constraints, teachers' expertise, resources, and so on. However, the more individualised and student-centred the curriculum planner wishes to make the provision, the more he/she needs to move away from the use of the Objectives Model towards the Process Model. If the ethos of vocational preparation, with its emphasis on "participatory experience", "the promotion of self-sufficiency and self-reliance", "problem-solving", and "negotiation through dialogue, and a checklist of basic skills and experiences", is to be implemented without distortion, the notion of teaching and learning as a carefully managed experiment (made explicit in DSLS) needs to be kept in the fore front of thinking. In this context, the project team of the Humanities Curriculum project stated that if teachers are asked to experiment, the Objectives Model is totally inappropriate because innovators are being asked to explore ideas which cannot be fully worked out in advance. They are engaged in "voyages of discovery, solving problems only as the lesson(s) or course is/are developed and making adaptations in the light of what happened in practice". This dilemma lies at the heart of vocational preparation. Whilst it is possible to specify broadly what basic skills young people should acquire, it is frequently not possible or desirable to specify one correct student response to experience. Many of the aims of ABC may after all, like those of HCP, involve the student being able to use "previously acquired 'thought systems' to grasp and make relationships" and "make creative responses which go beyond what is available and help to individualise it". Again, therefore, we must conclude that the ABC proposals would be strengthened by a markedly stronger adherence to the Process Model.

483. An examination of the preceding three documents, followed by a consideration of the statements in "Vocational Preparation" shows the extent to which FEU's thinking in relation to the notion of a checklist has become sharpened over time. The checklist (together with the contract, the learning agenda and the profile) is the product of an important transactional process which has far-reaching implications for the role relationships between staff, employers and young people, for the classroom/workshop climate, instructional procedures and indeed, the whole nature of teaching and learning in the vocational preparation area. ERL goes some way to establishing the link between participating in particular activities and attaining educational intentions, stating that the evidence will be demonstrated by picking up certain cues in the young person's behaviour and, therefore, implying that the checklist comes into being in an *ex post*

facto manner. In DSLS and ABC in contrast, the checklist appears more as a forerunner to experience and does not explicitly link the notion of that experience to the attainment of specifiable educational outcomes. "Vocational Preparation" however, states: "We cannot consider the checklist as a static device used only initially and never reviewed. It is not only necessary to regard the checklist as an essential diagnostic and assessment device, it is also necessary to regard (it) as a dynamic structure" to be "supplemented if necessary to the needs of society in general, to the local employment situation and to the young person". The conceptualisation of the checklist as a dynamic structure has corrected what appears to be inconsistency or uncertainty in FEU's previous thinking about the nature of the checklist.

The Organisation of Curriculum Content

484. Chapter 4 discussed the main ways in which subject matter can be integrated. One of these concerned integration organised on the basis of problems and issues/themes which cut across conventional subject/discipline boundaries. A further distinction was made between those problems/issues/themes which have a practical orientation (eg. in design and engineering) and those with a non-practical orientation (eg. in politics and law). All three documents, ERL, DSLS and ABC, reflect the extent to which a problem-oriented approach to the organisation of curriculum content is fundamental to vocational preparation. All the aims of the core curriculum in ABC have a problem-orientation, the intention being that at the end of the course the young person will "have a basis from which .... (to) make an informed and realistic decision with respect to his/her immediate future", "make satisfactory personal relationships with others", and so on. The Objectives/Experiences in the "core" point to the development of diagnostic skills in relation to personal needs and the solving of problems both through practical and non-practical means, while the focus in the vocational and job-specific components is on problem-solving of a more practical type.

485. Problem-solving features as a response to situations involving either the merger of subject matter from different disciplines or, in a subject-unrelated sense, as a response to everyday issues, personal and social relationships, and so on. In curricula where there is an orientation towards problems, there is usually a reliance on experience, either of a direct kind (eg. as described in ERL in relation to UVP) or of an indirect kind (through films, play, demonstrations, simulations role-playing, reconstruction of past experience, etc.) both of which need to be fully supported by the teacher organising the kinds of activities described in ERL (group discussion, project work, specific problem-tackling techniques).

486. Problem-solving features in a number of projects/courses in secondary and higher education (eg. Schools Council Humanities Curriculum project, Design and Craft Education, Project Technology, Integrated Science and the OU's Foundation course in Social Sciences). In each case it is an approach which points to certain skills, abilities and ways of thinking desirable as student outcomes, and to certain instructional procedures which are conducive to the attainment of those skills. Furthermore, the approach provides examples of curriculum situations where successful integration of content both within and across disciplinary boundaries has been achieved. In HCP integration is effected by tackling controversial issues of social concern through the use of evidence-based discussion, the evidence comprising a collection of photographs, statistical tables, films, tapes, slides, extracts from books, newspapers, etc. In the OU's Social Science Foundation course integration is brought about by using a problem-orientation of a different kind. Everyday assumptions about the causes of social problems are examined, followed by an introduction to the methods of social science (observing, measuring, analysing, and predicting) and an application of such methods to the same problems to show how different solutions are thrown up. In this latter case, then, the problem-solving skills arise from applying the processes of the discipline.

487. The school-based project which has probably given the most consideration to a problem-orientated curriculum is the Schools Council Design and Craft Education project. It has detailed the different stages

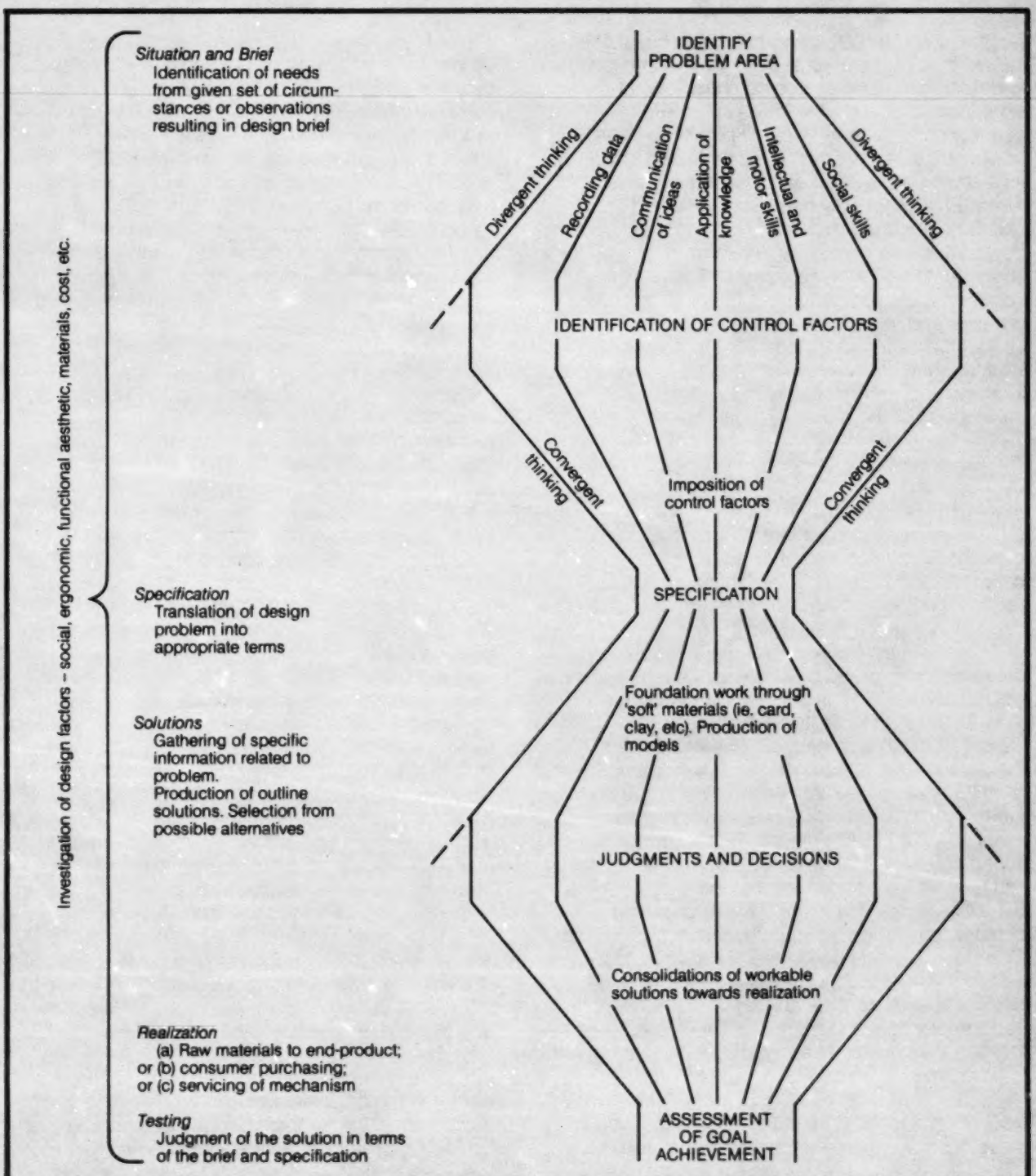
Investigation of design factors – social, ergonomic, functional aesthetic, materials, cost, etc.
Situation and Brief
Identification of needs from given set of circumstances or observations resulting in design brief
Specification
Translation of design problem into appropriate terms
Solutions
Gathering of specific information related to problem.
Production of outline solutions. Selection from possible alternatives
Realization
(a) Raw materials to end-product;
or (b) consumer purchasing;
or (c) servicing of mechanism
Testing
Judgment of the solution in terms of the brief and specification
IDENTIFY PROBLEM AREA
Divergent thinking
Recording data
Communication of ideas
Application of knowledge
Intellectual and motor skills
Social skills
Divergent thinking
IDENTIFICATION OF CONTROL FACTORS
Convergent thinking
Imposition of control factors
Convergent thinking
SPECIFICATION
Foundation work through 'soft' materials (ie. card, clay, etc). Production of models
JUDGMENTS AND DECISIONS
Consolidations of workable solutions towards realization
ASSESSMENT OF GOAL ACHIEVEMENT

Fig. 7: The Design Process (from *Materials and Design – a fresh approach* Schools Council Design and and Craft Education project published by Edward Arnold)

and skills involved in the design process diagramatically as in Fig. 7.
This project has shown that such a process is as relevant to problem-solving of a non-practical type as it is to practical problems. The project team refers to the fact that the activity of designing and problem-solving has been analysed in a number of fields (management science, pure and operational research, system engineering, etc.) and that patterned regularities in the activity have been observed, suggesting that all types of design and problem-solving call for certain types of skills (motor skills, communication skills, recording skills, and evaluation skills) and certain types of thinking (both creative and rational). Thus, the design model has an applicability beyond its relevance to work on materials-based subjects and can be used to solve problems in a wide range of situations. The model has a lot to offer to the implementers of ABC, in both practical and non-practical senses, with respect to all three of its components (viz. core studies, vocational studies and job-specific). Making this (or an adaptation of this) model available to FE staff would help considerably in delineating the relationship between content, experience, the development of generic skills and the aims of ABC. It also follows that the use of such a model results in the synthesis of hitherto separate (subject-based) items of skills and knowledge.

488. A curriculum oriented towards tackling problems, be it of a practical kind (as in Design and Craft Education) or of a non-practical kind (as in HCP), will, therefore, not observe conventional subject boundaries and will necessarily involve the application of problem-solving skills. At the implementation level, however, such a curriculum can pose problems. Institutional arrangements and teachers' perceptions sometimes run counter to the achievement of successful integration. Timetabling difficulties may not allow a number of staff to be released simultaneously with a particular group of young people, and staff may continue to identify themselves as "subject-experts" and use a teaching approach which reflects the distinctiveness and separateness of subjects. Successful integration not only implies an appropriate curriculum arrangement in which subjects lose their identities and become synthesised by a merger principle (see Chapter 4) but also appropriate institutional arrangements involving either a generalist teacher or a team of teachers who are committed to emphasising the *problem* rather than the *subject area*. Experience in the secondary sector with the Schools Council Integrated Studies project showed that integration failed for two main reasons: firstly because teachers, although engaged in team-teaching, continued to stress the concepts and processes of their own subjects; and secondly because on occasions teachers were asked to teach content which crossed disciplinary boundaries and was not conventionally found in school curricula (eg. anthropology). The Schools Council Integrated Science project (SCISP) found it easier to effect integration because it was confined to the sciences and even though biology, geology, physics and chemistry were brought together in an integrated way, the implementation was frequently within the capabilities of one teacher or at any rate achievable by a balanced team who were all scientists.

Instructional Procedures

489. It was stated in Chapter 5, that decisions about the style or strategy of teaching entails assumptions about how students learn and about what style of learning is most conducive the the attainment of particular curricular intentions. Attention was drawn to four dimensions along which teaching strategies can be located:-

i. expository – discovery;
ii. experiential – non-experiential;
iii. teacher control v student control (of learning outcomes);
iv. teacher-based learning v self-instruction.

490. Of the three FEU documents, DSLS has obviously given the most thought to instructional procedures. However, we feel that the discussion of the seven teaching models, (viz. "deficiency", "competency", "information-based", "socialisation", "experiential", "reflective" and "counselling".) would have been substantially strengthened had:-

a. more guidance been given to teachers about the type of instructional procedure which could be adopted in order to achieve the educational outcomes envisaged in the

models;

b. the implications of choosing a particular type of instructional approach been drawn out in relation to the organisation and presentation of social and life skills, the distribution of "control" over the content and manner of learning, and the nature of role relationships between staff and the young people concerned.

This could have been done by plotting the seven models along the four dimensions presented above and recording the information obtained from such an analysis under the space accorded to "risks" and potential advantages. For instance, the deficiency model which assumes "basic deficiencies in the young people" points to a higher degree of expository teaching than does the reflective model and to a higher degree of teacher control over learning outcomes than does the experiential model. This kind of information is useful in choosing instructional procedures and establishing the most conducive learning conditions for attaining the curriculum intentions. As presented, the seven models serve to confirm and label activities which teachers say they have undertaken, and thus provide an *ex post facto* rationalisation and coherence. But, they do not give sufficient guidance about the range of instructional procedures available or the matching of instructional procedures to the philosophy of the intentions. It is insufficient to tell implementing teachers that "activities are holistic and realistic", that a particular approach "is unlike most classroom teaching", or that "the active rather than passive approach may suit learning styles".

491. As has already been commented upon, ABC, while providing in the "Commentary" suggestions for instructional procedures, has unlike ERL, not given consideration to the link between learning activities and curriculum intentions; nor does it offer a rationale for the selection of a particular instructional procedure to achieve a particular intention. ERL is the only document which gives the implementing teacher help in choosing appropriate instructional procedures. ERL also goes some way towards recognising that a student-centred curriculum is incompatible with a reliance on exposition and that, if the curriculum intentions are to be met, learning outcomes must be student-controlled, be high on experientialism and involve some self-, rather than teacher-based learning. This kind of recipe would be broadly applicable to any vocational preparation scheme and needs fuller attention by referring to all four dimensions listed earlier. Otherwise, in the absence of explicit guidance, teachers may make decisions about instructional procedures on pragmatic grounds and not as a result of deliberate choice.

492. Each of the three reports stresses the use of experience in learning: the "experiential model" emphasised in DSLS; the dimension of "experience" in the three-stage model subscribed in ERL; and the "learning experience" suggested in ABC. DSLS and ABC advocate the use of experience because of its open-endedness, and because it provides "the opportunities for developing particular capacities not being clearly determined". ABC implies that exposure to experience, seen as inherently "worthwhile", will of itself produce worthwhile learning (but of an unspecified kind). Only ERL sensibly makes the point that "we don't necessarily learn from our experiences ... hence the need for appropriately supported reflection". Experience here is reinforced by further procedures intended to bring about reflection and the linked experience-reflection serves to "crystallise, reinforce previous learning, promote the development of concepts and generalisations and identify further specific learning if necessary."

493. This message is borne out if an examination is made of process-oriented, active, student-centred curricula from other sectors of education. A distinctive example of a curriculum ranking very high on experiential learning, maximum student control over learning outcomes and opportunities for self-instruction is the OU course "Art and Environment". The whole course is composed of student activities which are intended to give rise to an infinite diversity of responses and interpretations. These activities are followed up by generalised comment on common areas of difficulty, common emotional reactions or by comment designed to explain the experience, extend its qualities or offer background information to facilitate the student's own relfection on it. The activities which are designed to present ideas,

values and points of view draw on a wide range of different media and are intended to provoke "deep reflection and a new understanding of self and relationships". They extensively involve the use and development of cognitive, attitudinal and psychomotor skills but strictly on a student-controlled, self-instructional basis for which the student selects his own learning agenda, can exercise choice on which activities to reject and which to pursue and does them at his/her own pace. (The course guide states "Art and Environment is your learning process. The course is not to be found in the course materials but in your own activities while doing the projects. The time, energy and ideas will come from you.") Clearly the course is process-based in the true sense of the word, only acquiring existence through the student's interaction with the stimulus materials/experiences provided.

494. We note, however, that the Art and Environment course uses the notion of the student-chosen agenda rather than the negotiated agenda which features in ABC and ERL. A negotiated agenda also features in the Humanities Curriculum project, but negotiation occurs on a group basis giving rise to a consensus view similar to that presented in the checklist of ABC and Vocational Preparation. Unlike the situation envisaged in ABC, the HCP teacher takes no part in the negotiation process but puts maximum responsibility on students for their own learning by pursuing a criterion of neutrality* for the reason that the teacher's authority over controversial issues or personal problems cannot be justified either epistemologically or politically.**

Assessment and Evaluation

495. The reference to "profiling" as an evaluation tool in DSLS and the notion of "profile" as an assessment tool in ABC is confusing. "Profiling" (as used in DSLS) involves activities on the part of the teacher to appraise the assumptions underlying their teaching approaches in a SLS scheme while "profile" (as used in ABC) refers to the recording of the experiences and achievements of a student on an ABC course. One way out of this confusion would be to affix the word "course" or "scheme" in front of "profiling" and "student" in front of "profile" so as to ensure the distinction between the two.

496. It was noted earlier that the seven "models" in DSLS serve only to distinguish different orientations underlying pedagogical activity and that, regrettably, the accompanying "notes" do not provide an adequate description of the teacher's activities, pedagogical actions, nature of the teacher's role and the conditions for instruction to be created. This inadequate articulation of the "models" makes it difficult for them to be meaningfully considered in profiling activities undertaken for course evaluation. It is stated that in order to profile an SLS programme, one needs to know "*What* is being learned, *how* it is being learned, *why* it is being learned and how much attention is being given to it"? In other words there must be information available on:-

a. different types/kinds of knowledge;
b. instructional procedures;
c. rationales; for teaching and learning;
d. degrees of emphasis in teaching.

497. It is further stated that "no description of a scheme on paper can ever give us all these factors" and that opinions can be sampled from colleagues and students, together with self-analysis in order to categorise one's approach into one or a combination of the given "models" or to compare and contrast curriculum intentions with classroom/workshop reality. This idea of triangulation involving self, colleagues and students is an attractive one and worth considering further. In its present format "profiling" at best can only inform teachers about the bias/orientation of their SLS schemes and, therefore, cannot provide any information about the suitability of the content or the instructional procedures, the balance of the programme or its rationale. It, therefore, falls short of providing the essential function of an evaluation instrument, which is to contribute to the gauging of the *effects* and *effectiveness* of an educational programme, because it tells us nothing about the achievement of educational outcomes.

* "Neutrality" does not imply a value-free position. At the level of instructional procedures, there are clear preferences for certain types of values (rationality, sensitivity and tolerance). Neutrality favours democracy which implies open debate and dialogue.

** For the antithesis of this stance see the Schools Council Moral Education 13-18 project.

To remedy this more objective methods of collecting, observing and opinion using the principle of triangulation, combined with techniques for assessing student achievement, could be employed.

498. With respect to evaluation techniques which have been used in the secondary school projects in conjunction with an experimental approach to the curriculum, two projects are of particular interest, the Humanities Curriculum project and the Integrated Studies project. The remit of the latter was "to explore the problems and possibilities of an integrated approach to humanities teaching" and this involved a focusing on a way of organising a curriculum and a way of testing its effectiveness. Evaluation is described in this project as involving "continuous appraisal" by teachers, as a team, of their own work and it is suggested that the team keeps a summary of the "demands" placed on it which will offer a checklist to keep its work under review. The Teachers' Handbook offers some illustrative examples relating to the organisation of personnel and the organisation of integrated studies involving questions such as:-

> "What is the effectiveness of decision-making, free discussion, the distribution of tasks, follow-up?"
> "Could more colleagues be involved in the .... work?"
> "Is any aspect of the (work) impeded because room or materials are not available?"
> "What steps were taken to ensure that each (student) appreciated the significance of what he was doing and where different aspects interrelated?"

499. At the time of writing, the use of a simple profile for the assessment of students envisaged in ABC is moving in the direction of a national certification based mainly on internal assessment with external moderation. Indeed the situation has already been partly pre-exmpted by the CGLI in its scheme for Vocational Preparation (General) 365. Under this scheme "centres are required to monitor student achievement using a two-part profile. The first part including Communication Skills, Numeracy and Economic, Social and Environmental Studies is laid down by the Institute and is common to all schemes. The second part will be structured by the centre according to the needs of the course". However, as already remarked, the original proposals were conceived in a way which was not linked to national certification and hence, a change of direction will need to be thoughtfully conducted so that a distortion does not occur in the implementation of the curriculum proposals, because the requirements of certification have to be met. It could be that any future recommendations will see assessment in the same light as that of the Schools Council Integrated Studies project which states that assessment should be "a continuous appreciation of the contribution each (student) is making to the (scheme) which teachers and (students) have taken on together" and advocates three main components: continuous assessment; specific tests; and an observation checklist.*

500. A project which has given thought to ways in which problem-oriented curricula can be assessed is the Design and Craft Education project. Here it is acknowledged that, if the desired student outcomes are generic skills and abilities which are achievable in a number of ways and following a variety of routes, assessment must take a more individualised and possibly less formal approach. Process-skills and areas such as the application of personal effort, the extent of personal involvement, and the nature of the student's attitude change do not readily lend themselves to measurement but are important aspects of the curriculum. It states that "in many situations, the main evidence (on which assessment is to be based) must be judged subjectively by teachers, students and others" and advocates techniques such as self-assessment records kept by students and the observation of student progress by teachers and others. By "others" the project meant "other professionals with whom the student came into contact in the course of his .... studies – and the student himself" (eg. in the case of design studies

* a. Continuous assessment involves regular marking of work and keeping a record of performance.
b. Specific tests include tests devised to measure skills such as reading a timetable; questions devised to test the application of understanding to a new situation; oral questioning; and general attainment tests.
c. An observation checklist teachers draw up for each student listing hoped for achievements particularly in relation to personal and social skills.

this included "doctors, ward-sisters, architects and social workers"). This widening of involvement in the assessment procedure is in evidence in ERL and ABC and in other Schools Council projects, notably the Swindon Record of Personal Achievement and the Nuffield Working with Science project.

501. The Design and Craft Education project also raises the possibility of students being involved in their own assessment when the goals of the curriculum are intended to be met on an individualised, personal basis by students. This idea of negotiated assessment is also one used by "Art and Environment". Students are recommended to keep a journal or notes which they give/send to their tutors along with any finished "products" they may create so that the tutor has an insight into the conception/development of the students' ideas. They are also asked to produce an account of their learning experiences and state the grade they think they should be awarded and the reasons for this. The grade then emerges from the student-tutor dialogue by agreement or negotiation. If a compromise is not reached, a third party is asked to arbitrate.

502. In contrast the Humanities Curriculum project expresses the view that a totally process-based curriculum should not be assessed and that the teacher's task is to help the student develop his own personal criteria for self-appraisal. It puts emphasis on free discussion with all concerned of what is happening at all stages of the course, rather than arranging periodic precise measures of what has or has not been achieved. However, this exposes the teacher's strengths and weaknesses for if the teacher is trusted as a person, the student will not want grading; if he is distrusted, the student will seek a reliable objective assessment of his own ability.

503. Chapter 6 discusses how the assessment of non-intellectual, non-psychomotor skills (ie. characteristics such as "development of character", "social awareness", "social interaction skills", and "development of empathy", referred to as affective characteristics) can be achieved. It was argued that these could be assessed if an *a priori* clarification is made of the behaviour patterns deemed to be associated with such characteristics, and a number of techniques was noted (interviews, written tests/inventories and direct observation of students). Particular mention was made of the written tests used by the Schools Council Geography for the Young School Leaver and History 13-16 projects designed to raise issues involving personal viewpoints and to provide evidence of attitudes and sensibilities. Here "the marks were awarded for the student's ability to justify his opinions rather than for any particular view he holds".

504. Two other relevant projects are the Nuffield 'A' level Chemistry project (examined by the London GCE Board) and the Schools Council Integrated Science project (examined by the AEB) which include the consideration of affective characteristics in the guidelines for teacher-based assessment of practical work. The London Board specifies a 5-point rating scale based on behavioural manifestation of students' attitudes and the AEB suggests assessment based on written evidence, teacher observation and class discussion. The teacher keeps a careful record of his marks and observations throughout the course and combines them at the end of the period to make up the 20% awarded by internal assessment.

Conclusions

505. We propose to conclude our report by seeking to briefly answer two questions:

i. Are curriculum activities in FE really different from those in other sectors?
ii. What priorities are necessary with respect to curriculum activities within FE?

506. The answer to the first question must surely be that those tasks which are an integral component of the curriculum development process *per se* transcend educational sectors. However, there is a substantial element of choice in relation to the various styles and strategies which can be adopted to bring about curriculum change. As a consequence, successful curriculum planning/ development is a multi-stage process in which the initial stage must be a thorough grasp of the underlying principles. Decisions about the most

appropriate procedures to be adopted are then meaningful, provided, of course, that they are made in the light of a proper identification of the needs to be met and the resources required available to meet such needs.

507. With respect to the second question, we would endorse the FEU's demand (see "Teaching Skills" June 1982) for programmes of staff development to include major elements aimed at providing a thorough understanding of the principles of curriculum development. In the last decade the further education sector has been faced with an unprecedented curriculum explosion spanning both vocational and more recently, pre-vocational provision, a situation resulting in demands on staff which were quite incompatible with the curriculum development and curriculum evaluation expertise actually available within the sector. One vital means of improving the supply of personnel with an appropriate background is to provide increased opportunities for a critical study of developments outside FE. We hope that our report can assist in this process.

508. A second requirement is to look critically at the current provision. In the context of vocational courses possible starting points are the following:-

a. i. BEC, and even more so, TEC, need to question their undue emphasis on the Objectives Model as a means of achieving their intentions as stated. This is especially the case with respect to programmes leading to their higher awards;

ii. the Business Education Council needs to consider how it can further assist specialist staff involved in BEC programmes to really understand the nature of integration and to develop appropriate pedagogical skills to achieve integration in the classroom;

iii. the Technician Education Council needs to look critically at the extent to which its modular structure may be leading to a fragmentation of knowledge.

b. Award-making bodies, such as the RSA, should emulate the CGLI and question the continuing viability of policies based on seeing their function primarily as that of producing outline syllabuses and the setting and marking of the associated examinations. It is also important for these bodies to consider the nature of the pedagogical skills required to achieve the intended outcomes (eg. through the amplification of syllabuses and the production of teachers guides).

c. Consideration should be given to how best to ensure that appropriate evaluative procedures are an integral component of all future curriculum development activities within FE.

509. With respect to the "voc-prep" scene, we would suggest:-

a. that immediate consideration be given to:-

i. reducing the inconsistencies of treatment and confusion in terminology which exists in the totality of documents available;

ii. moving towards a more consistent terminology in future documents, whatever their source;

b. that there could be distinct advantages with respect to the curriculum core requirements in moving away from the present predominantly institution-based approach to curriculum development. The possibilities of a much more centralised approach, probably at regional or national level, should be looked at.

510. Finally the opportunity provided by the remit of looking in detail at curriculum development within and outside FE has thrown into sharp relief the extent to which the FEU, labouring under the considerable constraints of time and extremely limited resources, is providing both direction and support especially in relation to non-advanced course provision. Curriculum development in the school sector has, over the past two decades, received a great deal of support and guidance from the Schools Council. The curriculum challenge currently facing the FE sector, particularly in the context of "voc-prep", is in many ways even more daunting than that which faced the schools back in the 60's. It is appropriate that the FEU is to be given more resources in order to enable it to provide the further education sector with appropriate guidance and support which can only come through centralised policy-making.

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Appendix I
Overview of Selected Projects

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Categories

1. *Age range*
2. *Ability range* designed for
   T:top M:middle L:low
3. *Type*
   N:national R:regional L:local
   CT:central team CT+T: central team in co-operation with teachers
   T:teacher based
4. *Major intended outcomes* expressed in terms of
   C:concepts P:processes A:affective
   PSM:psychomotor skills
5. *Orientation*
   GE:general education VO:vocational orientation
6. *Established in response to*
   PP:political pressures NSEN:new special educational need ER:educational research
   STA:scientific/technological advance
   SC:social change CES:change within educational system
7. *Main focus of influence*
   CC:curriculum content M:teaching/teaching methods TR:teacher's role
8. *Type of material produced*
   TM:teachers materials PM:pupils materials
   THB:teachers handbook RM:resource material
   TB:textbook WB:workbook MB:media back-up OM:other materials CA:commercially available NCA:not commercially available
9. *Instructional approach*
   E:exposition/demonstration D:discovery/guided discovery PT:practical/experiential S :use of self-instructional materials RB:resource based
10. *Organisation of content*
    S:single subject CO:co-ordinated
    IA: intradisciplinary ID:interdisciplinary
11. *Pupil assessment*
    FE:formally examined (O/A/CSE)
    NE:non-examined
12. *Teacher preparation*
    LM:local meetings W:workshops RM:regional meetings NC:national conferences OS:other schemes
13. *Mode of evaluation*
    SU:summative

Notes

3. CT+T: describes varying degrees of collaboration between a project team and groups of teachers which went beyond nominal consultation to a real attempt to involve teachers in all or most of a project's development and subsequent stages.
   T: describes a project which developed in response to demands by a group or groups of teachers at local or regional level involving high collaboration with and participation by these teachers.
4. C: describes the concepts. P: describes the characteristic processes of a subject or discipline, to be acquired by the learner.
7. TR: refers to a situation requiring a major change in the teacher's role.
9. Experiential denotes the deliberate exposure of the learner to a phenomenon or a situation through which the learner is intended to develop insights, skills, attitudes, etc.
   SI: Self-instruction relates to situations in which the direct control of the learning is shifted to the student.
   RB: describes situations where the student is provided with free access to a wide variety of learning resources under guidance.
10. CO:describes situations where different subjects (or part-subjects) are brought together so as to effect complimentarity and interaction but where the identity of the subjects is retained.
    Integration describes the process of merging different subjects (or part-subjects) so that the individual subjects lose their identity and a new field of learning emerges.
    IA: refers to integration within a particular field of knowledge.
    ID: refers to integration of subjects (or part-subjects) drawn from *different* fields of knowledge.
13. Since most projects include an element of formal evaluation, the analysis highlights instances of summative evaluation only.

SET I Humanities/Communication Area

	Modern Lang. Project 1963-75	Lang. in Use (Ling. & Eng. T)	English for Immigrant Children	Camb. School Classics 1966-78	Environmental Studies 1967-71	Humanities Curr. Project 1967-72	Moral Education 1967-72	N.W.Regional Curr. Dev. Project 1967-72	Integrated Studies Project 1965-72	General Studies Project 1968-74
1. Age range	8 - 16	11 - 18+	5 - 16	11 - 16	5 - 13	14 - 16	13 - 16	13 - 16+	11 - 15	15 - 19
2. Ability range	T + M + L	T + M + L	T + M + L	T + M + L	T + M + L	M + L	M + L	M + L	T + M + L	M (has been adapted for use with L)
3. Type	N CT	N CT	N CT	N CT	N CT + T	N CT	N CT + T	R T	N CT + T	N CT + T
4. Major intended outcomes	C	C + A	C + A	C	P + (A)	A + (C)	A	varies with sub. area C + (A)	C + P + (A)	variable
5. Orientation	GE	GE	GE	GE	GE	GE	GE	GE	GE	GE
6. Established in response to	SC	ER	NSEN	CES	CES	SC	ER + CES	SC	ER + CES	ER
7. Main focus of influence	CC + M	M	M	CC + M	M	M + TR	CC + M	CC + M	M	M
8. Type of material produced	TM + PM THB + RM TB + WB + MB CA	TM THB + RM CA	TM + PM THB + RM WB + MB CA	TM + PM THB + RM TB + WB + OM CA	TM THB (guide to prod. local RM) CA	TM + PM THB + RM + MB CA (except material on race)	TM + PM THB + RM TB (booklet) CA	TM + PM + THB + RM WB (w'sheets) + MB CA (Eng./Domestic Studies/Soc.Ed)	TM + PM THB + RM WB (w'sheets) + MB CA	TM + PM + THB + RM OM (stud. study units) CA
9. Instructional Approach	E PT	D PT	E PT	E	D PT	D + RB	D	varies with subject area	(D) + (RB)	(D) + RB
10. Organisation of content	S			S	ID	ID	ID	S	CO	CO
11. Pupil Assessment	FE(O)	NE (but provides suitable basis for CSE Mode 3 courses)	NE	FE(O) NE	NE	NE	NE	NE	NE FE(CSE)	FE(A) NE
12. Teacher Preparation	LM + W + RM + NC		RM (for trials teaching)	C[illegible]	LM + W	W + RM NC + OS	OS (B'ground text)	LM + W + RM	LM + OS	OS (Establ. resource centres)
13. Mode of Evaluation					SU	SU			SU	

SET I (continued)

	Religious Ed. in Sec. Schools 1969-73	Geography 14 - 18 1970-75	Geography for the Young Sch. Leaver 1970-79	History, Geog. & Social Science 1971-75	Career Educ. & Guidance 1971-77	History 13 - 16 1972-77	Health Education 1973-78	Project Environment 1970-73	Writing across the Curriculum 1971-76
1. Age Range	11 - 16	14 - 18	14 - 16	8 - 13	13 - 18	13 - 16	5 - 13	8 - 18	11 - 16
2. Ability range	T + M + L	T	M + L	T + M + L	T + M + L	T + M + L	T + M + L	T + M + L	T + M + L
3. Type	N CT + T	N CT + T	N CT + T	N CT + T	N CT + T	N CT + T	N CT + T (& other experts)	N CT + T	N CT + T
4. Major intended outcomes	C + A	C + (P)	C + (A)	P + (A)	C + (A)	P + (A)	C + A	C + A	A
5. Orientation	GE	GE	GE	GE	GE + VO	GE	GE	GE	GE
6. Established in response to	ER + CES	ER	CES	ER	PP + NSEN + SC	ER + SC	ER + STA	STA + SC	ER
7. Main focus of influence	CC	CC + M	CC + M	M	CC	CC + M	CC	M	M
8. Type of material produced	TM + PM THB TB (booklets) CA	TM + PM THB + RM CA	TM + PM THB + RM WM + MB + OM CA	TM + PM THB + RM TB (x1st) + MB + OM CA	TM + PM THB + RM OM CA	TM + PM THB + RM WB + MB CA	TM +PM THB + RM WB + MB CA	TM + PM THB CA	TM THB (explan. Bulletin) CA
9. Instructional Approach	E	(D)	D + (PT) + RB	D	D + (PT)	D	E	D	
10. Organisation of content	ID	S	S/ID	CO		S	ID	ID	
11. Pupil Assessment	NE	FE (O)	FE (CSE) NE	NE	NE	FE(O + CSE)	NE	NE	NE
12. Teacher Preparation	LM + W + RM OS (project built)	LM + W OS (co-ords)	LM + W + NC (co-ord) OS (cr.grps/news letter)	LM + W + RM OS (newsletter)	LM + RM	LM + W OS (services)	NC	informal	LM + W + RM + N OS (res. course)
13. Mode of Evaluation									

SET II Science/Mathematics Area

	School Maths Project (SMP) 1961-	Manchester Maths Group 1962	Maths in Ed. & Industry 1962	Nuffield O level Science Projects 1962-66	Scots Maths Group Project 1963-75	Salop Maths Experiment 1963-70	Nuffield Combined Science 1965-69	Nuffield A level Science Projects 1965-70	Nuffield Sec. Science 1965-70	Maths for the Majority 1967-72
1. Age Range	7 - 19	11 - 16	12 - 18	11 - 16	11½ - 16 & 16- 18	11- 16	11 - 13	16 - 18	13 - 16	13 - 16
2. Ability range	T + M + L	T	T + M	T	T	T + M + L	T + M + L	T	M + L	M + L
3. Type	N CT	L T	L T	N CT	R T	R CT + T	N CT	N CT	N CT	N CT
4. Major intended outcomes	C	C	C	C + (P) + PSM	C	C	C + (P) + PSM	C + PSM	C + P + PSM	C + P
5. Orientation	GE	GE	GE + VO	GE	GE	GE	GE	GE	GE	GE
6. Established in response to	STA + SC	NSEN	NSEN + STA	PP + STA	STA + CES	STA + SC	STA + CES	STA + PP	SC	SC
7. Main focus of influence	CC	CC + M	CC	CC + M	CC + M	M	M	CC	CC + M	CC + M
8. Type of material produced	TM + PM THB + RM TB + WB CA	TM + PM TB CA	TM + PM TB CA	TM + PM + THB + RM WB (w'sheets) + MB OM (new equipment) CA	TM + PM THB + RM TB + WB + MB CA	TM + PM TB OM (descriptive) CA	TM + PM THB + RM WB + MB CA	TM + PM THB + MB TB (pupil guides) CA	TM + PM THB + MB OM (new equip.) CA	TM THB (guides) CA
9. Instructional Approach	D	E	E	D	E	E	D + PT	E + PT (SI)	D + PT	D + PT
10. Organisation of content	S	S	S	S	S	S	CO	S	IA	S
11. Pupil Assessment	FE (O + A + CSE)	FE (O)	FE (O + A)	FE (O)	FE (O + A(Scot))	FE (O + CSE)	NE (but can be used as basis for O & CSE in Phys. Chem & Biology)	FE (O)	FE (CSE) NE	FE (CSE) NE
12. Teacher Preparation	NC OS (Newsletter)	LM	W + NC	LM + W + RM	LM + W + NC OS (Res. C + N'ltr)	LM	W + NC (in-serv. training course)	OS (in-serv. training)	LM + W + RM + NC	LM + W + RM
13. Mode of Evaluation		SU							SU	

SET II (continued)

	Science 5 - 13 1967-75	Sixth Form Maths Curriculum Proj. 1969-78	Integrated Science Project (SCISP) 1969-78	B'ham Structured Maths Scheme 1970-	Maths for the Majority Contn. 1971-75	Science for the Less Able Child 1975-77	Kent Maths Project 1975-77
1. Age Range	5 - 13	16 - 18	13 - 16	11 - 16	13 - 16	14 - 16	11 - 16
2. Ability range	T + M + L	non-specialist + ML students 'A'	T	M + L	M + L	L	L (very slow learner)
3. Type	N CT	N CT	N CT + T	L T	N T + outside supp.	L T	L T
4. Major intended coutcomes	P + PSM	C + P	C + (P) + (A) + PSM	C	C + P	P + (C)	C
5. Orientation	GE	GE	GE	GE	GE	GE	GE
6. Established in response to	ER + CES	ER	NSEN	NSEN	NSEN	STA + CES	NSEN
7. Main focus of influence	M	M	CC + M	CC	CC	M	CC
8. Type of material produced	TM THB CA	TM + PM + THB TB (booklets) WB + OM CA	TM + PM + THB TB (reader) OM (Techn. manual) CA	TM + PM + THB WB (worksheets) MB NCA	TM + PM + THB RM + TB (b'lets) WB + MB CA	TM + PM THB + RM WB CA	TM + PM + THB WB + MB OM (Perf. tests) CA
9. Instructional Approach	D + PT		D + PT		D + PT	D + PT	D + PT
10. Organisation of content	IA	S	IA + (ID)	S	S	IA	S
11. Pupil Assessment	NE	FE (A/O)	FE (O)	FE (CSE) NE	FE (CSE) NE	NE	NE
12. Teacher Preparation	W + RM	W + NC	LM + W + RM	LM (occasional)	LM + RM + W	LM OS	LM OS (local Res. course)
13. Mode of Evaluation	(SU)			(SU)			

SET III Craft, Design and Technology Area

	Project Technology 1967-72	Design & Craft Education 1968-73	Art & Craft Education 1969-72	Engineering Science 1970-81	Modular Courses in Technology 1976-78
1. Age Range	11 - 18	13 - 16+	8 - 13	16 - 18	14 - 16
2. Ability Range	T + M + L	M + L	T + M + L	T	T + M + L
3. Type	N CT	N CT	N CT	N CT	L T
4. Major intended outcomes	P + A	C + P + A + PSM	P + PSM	C + PSM	C + PSM
5. Orientation	GE + (VO)	GE	GE	GE + VO	GE + (VO)
6. Established in response to	STA + SC	ER + STA + SC + *CES*	*CES*	*PP* + STA	PP + STA
7. Main focus of influence	CC	CC	M	CC	CC
8. Type of material produced	TM + PM THB + RM TB + OM CA	TM + PM THB + RM TB + MB CA	TM THB + RM MB + OM CA	TM + PM THB + RM (guide) TB CA	TM + PM THB + RM (guide) TB + WB (pupil) NCA but also CA
9. Instructional Approach	RB	D + PT	D + PT	PT	PT
10. Organisation of content	CC	ID	ID	S or CO	ID
11. Pupil Assessment	NE (FE)	NE (FE(CSE)	NE	FE (A)	FE (CSE)
12. Teacher Preparation	RM OS (Bull + curr. centres)	LM + W + RM Cs (journ. + co-ords)	LM	W + RM OS (bulls. + visits)	LM + W
13. Mode of Evaluation					

List of Curriculum Projects Analysed in Grids

For further details readers may wish to consult Schools Council Project Profiles and Index (160 Great Portland Street, London W1N 6LL) and the Mathematical Association's guide to Mathematics Projects in British Secondary Schools (259 London Road, Leicester).

Art and Craft Education 8 - 13

Directors	Miss Audrey Martin, Dr Renee Marcouse, M. Laxton
Location	Goldsmiths' College, University of London, 7 Dixon Road, New Cross, London SE14 6NW
Duration	1969 - 1972
Age Range	8 - 13
Financed by	Schools Council
Publishers	Education Productions Ltd. Bradford Road, East Ardsley, Wakefield, Yorkshire WF3 2JN

City of Birmingham Structured Mathematics Scheme

Director	L. P. Hamshere
Location	The Structured Mathematics Centre, Reaside School, Rea Street South, Birmingham B5 6LB
Duration	1970 -
Age Range	11 - 16
Financed by	The City of Birmingham

Cambridge School Classics Project

Director	D. J. Morton
Location	Cambridge University, 17 Panton Street,Cambridge CB2 6LB
Duration	1966 - 1978
Age Range	11 - 16
Financed by	Schools Council and Nuffield Foundation
Publishers	Cambridge University Press, Bentley House, 200 Euston Road, London NW1

Careers Education and Guidance

Directors	K. Devine (1971-74) Gordon Reece & John Storey (1974-77)
Location	The Village College, Impington, Cambridge CB 4 4LU
Duration	1971 - 1977
Age Range	13 - 18
Financed by	Schools Council and industrial and other organisations
Publishers	Longman Group Ltd, Burnt Mill, Harlow, Essex CM20 2JE

Design and Craft Education

Director	Professor S. J. Eggleston
Location	University of Keele, Dept. of Education, Keele ST5 5BG
Duration	1968 - 1973
Age Range	13 - 16+

Financed by	Schools Council
Publishers	Edward Arnold (Publishers) Ltd., Woodlands Park Avenue, Maidenhead

Engineering Science

Director	Professor L. M. Cantor
Location	Engineering Science Development Unit, University of Technology, Loughborough LE11 3TU
Duration	1970 - 1981
Age Range	16 - 18
Financed by	Schools Council and Loughborough University
Publishers	Macmillan Education, Houndmills, Basingstoke, Hants.

English for Immigrant Children

Director	J. Ridge
Location	Leeds University, Institute of Education, Leeds LS2 9JT
Duration	1966 - 1971
Age Range	5 - 16
Financed by	Schools Council
Publishers	Longman Group Ltd., Burnt Mill, Harlow, Essex CM20 2JE

Environmental Studies

Director	M. Harris
Location	Cartrefle College of Education, Wrexham, Clwyd
Duration	1967 - 1971
Age Range	5 - 13
Financed by	Schools Council
Publishers	Hart-Davis Education, Granada Publishing Ltd., 29 Frogmore, St. Albans, Herts. AL2 2NF

General Studies Project

Director	R. Irvine Smith
Location	Department of Education, University of York, York YO1 2EW
Duration	1968 - 1974
Age Range	15 - 19
Financed by	Schools Council
Publishers	Longman Group Ltd., Burnt Mill, Harlow, Essex.

Geography 14 - 18

Directors	Dr Gladys Hickman (until July 1973); J. Reynolds (August 1973-August 1974) H. Tolley (September 1974-1975)
Location	School of Education, University of Bristol, 22 Berkley Square, Bristol BS8 1HS
Duration	1970 - 1975
Age Range	14 - 18
Financed by	Schools Council and N Ireland
Publishers	Macmillan Education, Houndmills, Basingstoke, Hants.

Geography for the Young School Leaver

Directors	R.A. Beddis & T.H. Dalton (until 1974): T. Higginbottom

Location	Avery Hill College of Education, Avery Hill Road, London SE9 2PQ
Duration	1970 - 1979
Age Range	14 - 16
Financed by	Schools Council
Publishers	Thomas Nelson & Sons Ltd., Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex TW16 7HP.

Health Education 5 - 13

Director	Trefor Williams
Location	Colchester Institute of Higher Education, Marine Parade, Clacton on Sea, Essex CO15 6AJ
Duration	1973 - 1978
Age Range	5 - 13
Financed by	Health Educational Council and Transport & Road Research Laboratory
Publishers	Thomas Nelson & Sons Ltd., Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex Tw16 7HP

History 13 - 16

Director	A.J. Boddington
Location	School of Education, 31 Lyddon Terrace, The University, Leeds LS2 9JT
Duration	1972 - 1977
Age Range	13 - 16
Financed by	Schools Council
Publishers	Holmes McDougall, 137-141 Leith Walk, Edinburgh EH6 8NS

History Geography and Social Science 8 - 13

Directors	Professor W.A.L. Blyth and R. Derricott
Location	School of Education, The University, Liverpool L69 3BX
Duration	1971 - 1975
Age Range	8 - 13
Financed by	Schools Council
Publishers	Collins Education, Westerhill, Bishopriggs, Glasgow G4 0NB and ESL, Waverley Road, Yate, Bristol BS17 5RB

Humanities Curriculum Project

Director	L. A. Stenhouse
Location	Centre for Applied Research in Education, University Village, University of East Anglia, Norwich NR4 7TJ
Duration	1967 - 1972
Age Range	14 - 16+
Financed by	Schools Council and Nuffield Foundation
Publishers	Heineman Educational Books Ltd., 48 Charles Street, London W1X 8AH

Integrated Science Project

Directors	W.C. Hall & B.S. Mowl (until 1973) M. Lyth (1974-76)
Location	Centre for Science Education, Chelsea College, Bridges Place, London SW6 4HR
Duration	1969 - 1978

Age Range	13 - 16
Financed by	Schools Council, Ministry of Education in N Ireland and AEB
Publishers	Longman Group, Burnt Mills, Harlow, Essex CM20 2JE

Integrated Studies Project

Director	D. Bolam
Location	Institute of Education, University of Keele, Keele, Staffs. ST5 5BG
Duration	1968 - 1972
Age Range	11 - 16
Financed by	Schools Council
Publishers	Oxford University Press, Education Dept., Walton Street, Oxford OX2 6DP

Kent Mathematics Project

Director	B. Banks
Location	Teachers' Centre, 6 Culverden Park Road, Tunbridge Wells, Kent TN4 9QX
Duration	1975 - 77
Age Range	11 - 16
Financed by	Schools Council
Publishers	Ward Lock Educational, 116 Baker Street, London W1M 2BB

Linguistics and English Teaching: Language in Use Project

Directors	Professor M.A.K. Halliday (until 1971) P. Doughty (from 1971)
Location	Communications Research Centre, Dept. of General Linguistics, University College, London WC1E 6BT
Duration	1964 - 1971
Age Range	11 - 18+
Financed by	Schools Council
Publishers	Edward Arnold Ltd., 25 Hill Street, London W1X 8LL

Manchester Mathematics Group

Director	F. Gorner
Location	Didsbury College of Education, Wilmslow Road, Manchester 20
Duration	1962 -
Age Range	11 - 16
Publishers	Hart Davis Educational Ltd., Granada Publishing, 29 Frogmore, St. Albans, Herts. AL2 2NF

Mathematics for the Majority

Director	P Floyd
Locatio	Institute of Education, University of Exeter, Exeter EX4 3QL
Duration	1967 - 1972
Age Range	13 - 16
Financed by	Schools Council
Publishers	Hart Davis Educational Ltd., Granada Publishing, 29 Frogmore, St. Albans, Herts. AL2 2NF

Mathematics for the Majority Continuation Project

Director	P. Kaner (1971-1974); N. Pass (1975)
Location	3 The Cloisters, Cathedral Close, Exeter EX1 1HS
Duration	1971 - 1975

Age Range	13 - 16
Financed by	Schofield & Sims, 35 St. John's Road, Huddersfield HD1 5DT

Mathematics in Education and Industry

Director	S.L. Parsonson
Location	57 High Street, Harrow-on-the-Hill, Middlesex HA1 3HT
Duration	1962 -
Age Range	12 - 18
Financed by	partly by Industrial Fund of the Mathematical Association
Publishers	Various

Modern Languages Project

Directors	Professor A. Spicer (until 1969); D. Rowlands (1970-72); D. Rix (from 1973)
Location	University of York, Micklegate House, Micklegate, York YO1 1JZ
Duration	1963 - 1975
Age Range	8 - 16
Financed by	Nuffield Foundation and Schools Council
Publishers	E J Arnold & Son Ltd., Butterley Street, Leeds LS10 1AX

Modular Courses in Technology

Co-ordinators	R. L Page and J. T. Poole
Location	Science & Technology Centre, University of Bath, School of Education, Claverton Down, Bath BA2 7AY and Avon Science & Technology Centre, Bristol
Duration	1976 - 1978
Age Range	14 - 16
Financed by	Schools Council

Moral Education 13 - 16

Director	P. McPhail
Location	Dept. of Educational Studies, University of Oxford, 15 Norham Gardens, Oxford CX2 6PY
Duration	1967 - 1972
Age Range	13 - 16+
Financed by	Schools Council
Publishers	Longman, Longman House, Burnt Mill, Harlow Essex

North West Regional Curriculum Development Project

Director	Dr. W.G.A. Rudd
Location	School of Education, University of Manchester, Manchester M13 9PL
Duration	1967 - 1972
Age Range	13 - 16+
Financed by	Schools Council and LEAs
Publishers	Blackie & Son Ltd., Bishopbriggs, Glasgow G64 2NZ Holmes McDougall Ltd., 137-141 Leith Walk Edinburgh. Macmillan Education Ltd., Houndmills, Basingstoke, Hants RG21 2XS

Nuffield Advanced Science Teaching Projects – Biology, Chemistry and Physics

Directors	Professor P. J. Kelly (Biology); Professor E.H. Coulson (Chemistry); Professor P. J. Black & J. M. Ogborn (Physics)
Location	Centre for Science Education, Chelsea College, Bridges Place, London SW6 4HR
Duration	1965 - 1971
Age Range	16 - 18
Financed by	Nuffield Foundation
Publishers	Longman Group Ltd., Burnt Mill, Harlow, Essex CM20 2JE

Nuffield Combined Science

Director	M. J. Elwell
Location	City of Birmingham College of Education, Westbourne Road, Birmingham B15 3TN
Duration	1965 - 1969
Age Range	11 - 13
Financed by	Nuffield Foundation
Publishers	Longman Group Ltd., Burnt Mill, Harlow, Essex

Nuffield 'O' Level Science Projects – Biology, Chemistry and Physics

Directors	Professor W. H. Dowdeswell (Biology), Professor H. F. Halliwell (Chemistry), Professor E. M. Rogers (Physics)
Location	Centre for Science Education, Chelsea College, Bridges Place, London SW6 4HR
Duration	1962 - 1966
Age Range	11 - 16
Financed by	Nuffield Foundation
Publishers	Longman Group Ltd., Burnt Mill, Harlow, Essex.

Nuffield Secondary Science

Organizer	Mrs Hilda Misselbrook
Location	Centre for Science Education, Chelsea College, Bridges Place, London SW6 4HR
Duration	1965 - 1970
Age Range	13 - 16
Financed by	Nuffield Foundation and Schools Council
Publishers	Longman Group Ltd., Burnt Mill, Harlow, Essex.

Project Environment

Director	R. W. Colton
Location	Dept. of Education, The University, Newcastle-upon-Tyne, NE1 7RU
Duration	1970 - 1973
Age Range	8 - 18
Financed by	Schools Council
Publishers	Longman Group Ltd., Burnt Mill, Harlow, Essex.

Project Technology

Director	G.B. Harrison
Location	Loughborough College of Education, Loughborough LE11 0BR
Duration	1967 - 1972
Age Range	11 - 18
Financed by	Schools Council

Publishers	Heinemann Educational Books Ltd., 48 Charles Street, London W1X 8AH

Religious Education in Secondary Schools

Director	Professor N Smart
Location	Dept. of Religious Studies, University of Lancaster, Furness College, Bailrigg, Lancaster LA1 4YL
Duration	1969 - 1973
Age Range	11 - 16
Financed by	Schools Council
Publishers	Hart-Davis Educational, Granada Publishing Ltd., Frogmore, St. Albans, Herts.

The School Mathematics Project

Chairman of Trustees	Dr B. Thwaites
Location	Westfield College, Hampstead, London NW3 7ST
Duration	1961 -
Age Range	7 - 19
Financed by	Self-Supporting
Publishers	Westfield College, Hampstead, London NW3 7ST

Science for the Less Able Child (Birmingham)

Co-ordinator	F.L. Darrall
Location	Birmingham Science & Mathematics Centre, St. Lukes Road, Birmingham B5 7DA
Duration	1975 - 1977
Age Range	14 - 16
Financed by	Schools Council
Publishers	Hutchingson Publishing Group and Hart-Davis Educational, 29 Frogmore, St. Albans, Herts.

Science 5 - 13

Director	L. F. Ennever
Location	School of Education, University of Bristol, 19 Berkely Square, Bristol BS8 1HF
Duration	1967 - 1975
Age Range	5 - 13
Financed by	Schools Council, Nuffield Foundation, Scottish Education Dept. and Plastics Institute
Publishers	Macdonald Educational, 49 Portland Street, London W1A 2LG

Scottish Mathematics Group (Scottish) Project

Director	P. Whyte
Location	Hutchesons' Grammar School, Beaton Road, Glasgow.
Duration	1963 -
Age Range	11½ - 18
Financed by	Scottish Education Dept.
Publishers	Blackie & Son, Bishopbriggs, Glasgow and W. & R. Chambers 11 Thistle Street, Edinburgh

Shropshire Mathematics Experiment

Director	R.S. Heritage
Location	71 Sandbach Road North, Alsager, Stoke on Trent ST7 2AQ.

Duration	1964 - 1970
Age Range	14+
Financed by	Shropshire LEA
Publishers	Penguin Books Ltd., Harmondsworth, Middlesex

Sixth Form Mathematics Curriculum Project

Director	C.P. Ormell
Location	School of Education, University of Reading, Reading RG1 5AO
Duration	1969 - 1978
Age Range	16 - 18
Financed by	Schools Council
Publishers	Heinemann Educational Books, 48 Charles Street, London W1X 8AH

Writing Across the Curriculum 11 - 16

Director	Miss N. Martin
Location	Institute of Education, University of London, 20 Bedford Way, London WC1H 0AL
Duration	1971 - 1976
Age Range	11 - 16
Financed by	Schools Council
Publishers	Ward Lock Educational, 116 Baker Street, London W1M 2BB

Appendix 2
Case Studies

As indicated in Chapter 1, the Project produced a number of *working documents* in the form of in-depth studies of nine projects with respect to the four key issues. These projects were:-

The Schools Council Integrated Science Project (SCISP)
The Nuffield/Schools Council Humanities Curriculum Project
The Schools Council Design and Craft Education Project
The Open University Foundation Course in Social Science –
"Making Sense of Society" (D101)
The Schools Council Geography 14 - 18 Project
The Schools Council Project Technology
The Schools Council North West Regional Curriculum Development Project
The Schools Council Integrated Studies Project
The Open University Interdisciplinary Second Level Course –
"Art and Environment" (TAD292)

These working documents, NINE CASE STUDIES: KEELE FE CURRICULUM ANALYSIS PROJECT 1981, may be borrowed for reference purposes from the Education Library, University of Keele, Keele, Staffordshire ST5 5BG, through normal inter-library procedures.

FEU Publications

Curriculum styles and strategies is one of a number of FEU publications intended to inform teachers and others and to stimulate professional discussion about matters of concern to the Further Education Service. Other FEU publications relevant to **Curriculum styles and strategies** include:

Experience reflection learning: some suggestions for organisers of schemes of unified vocational preparations	April 1978
A basis for choice: report of a study group on post – 16 pre-employment courses	June 1979
Supporting YOP	July 1979
Developing social and life skills: strategies for tutors	January 1980
Vocational preparation	January 1981
Curriculum control: a review of major styles of curriculum design in FE	March 1981
ABC in action: a report from an FEU/CGLI working party on the piloting of "A basis for choice"	September 1981
Progressing from vocational preparation: the issues (a discussion paper)	January 1982
Tutoring: the guidance and counselling role of the tutor in vocational preparation	June 1982
Teaching skills: towards a strategy of staff development for vocational preparation	June 1982
A new training initiative: joint statement by MSC/FEU. 1 General principles	September 1982
Profiles: a review of issues and practice in the use and development of student profiles	September 1982
Basic skills	November 1982
Who cares?: a curriculum policy for caring courses at the initial level.	November 1982

Copies of these documents (which are free of charge) are obtainable while stocks last from the Publications Despatch Centre, Department of Education and Science, Honeypot Lane, Canons Park, Stanmore, Middlesex HA7 1AZ. Tel. No. 01-952 2366 Ext. 503.

A complete list of FEU publications is available from Publications Despatch Centre.